



ARMY INSTITUTE OF TECHNOLOGY, PUNE

An Autonomous Institute

Affiliated to Savitribai Phule Pune University, Maharashtra, India

DEPARTMENT OF COMPUTER ENGINEERING



National Education Policy (NEP)-2020 Compliant Curriculum

First Year Engineering (2025 Pattern)

B. Tech Computer Engineering

(With effect from Academic Year 2025-26)

www.aitpune.com





Dept. of Computer Engineering, AIT Pune.

Head of Computer Department Army Institute of Technology Dighi Hill's,Pune - 15.

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VISION OF THE INSTITUTE

To become a "Globally Recognised" technical institute providing world class education and research facilities to the wards of Defence personnel.

MISSION OF THE INSTITUTE

- (a) Provide the right environment, to the wards of Defence personnel, for development of physical, intellectual, emotional and spiritual quotients, with a view to produce total quality engineers.
- (**b**) Create an ecosystem which can foster the culture of research, innovation, creative thinking and higher studies.
- (c) Develop an education system which creates entrepreneurs and technology leaders who are committed towards sustainable development of society and nation building

CORE VALUES OF THE INSTITUTE

Excellence, Honesty, Integrity, Team Work, Continuous Learning and Innovation.

VISION OF THE DEPARTMENT

To provide best quality education and research facilities to the wards of all defence personnel to produce globally competent computer engineering graduates.

MISSION OF THE DEPARTMENT

- M1:To provide state of the art infrastructure to the wards of army personnel to produce total quality computer engineer
- M2:To create an environment which can promote the culture of research, innovation, creative, thinking, and higher studies
- M3:To collaborate with industry fraternity to create entrepreneurs and technology leaders who are committed towards sustainable development of information society

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

- **PEO 1:** To have high level of technical competency combined with research and problemsolving skills to generate innovative solutions in computer engineering or related areas
- **PEO 2:** To be able to communicate with various stakeholders and be able to practice their profession with high regard to social needs and diversity at their professional workplace
- **PEO 3:** To continuously upgrade in sync with the pace of technologies that are relevant to their career, participate in personal development and increasing their understanding of matters that are important to society at national and international levels



Prof. (Dr.) S. R. Dhore Head of Computer Department Army Institute of Technology Dighi Hill's,Pune - 15.

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PREFACE

The National Education Policy (NEP) 2020 has shown pathway to make India a global knowledge superpower. Army Institute of Technology (AIT) with its new Vision has already started working in that direction. As an important milestone, it has been conferred academic autonomy by UGC and SPPU and has prepared first ever curriculum under autonomy.

The Department of Computer Engineering at AIT Pune is committed to the effective and fruitful implementation of NEP 2020 in its true spirits emphasizing holistic and multidisciplinary education as per the directives of Maharashtra government. It emphasizes a multidisciplinary approach, aiming to develop critical thinking and creativity, thereby contributing to the holistic development of individuals.

We are delighted to present the first-year engineering syllabus 2025 pattern, which has been meticulously designed in alignment with the NEP 2020 with effect from academic year 2025-26. This curriculum aims to provide students with a holistic approach to engineering education ensuring a strong foundation in Mathematics and Science courses. This curriculum also includes components of vocational and skill enhancement courses, Indian Knowledge System and Co-curricular courses to shape well-rounded engineers who can adapt to global demands. Also, this document provides information on the credit system, course contents, and examination and evaluation scheme along with guidelines to make best use of the curriculum designed.

The syllabus encourages experiential learning, where theoretical concepts are supported by practical laboratory sessions. It also promotes research and innovation, encouraging students to engage in projects from the early stages of their academic journey. I wish to thank all the Board of Studies members who contributed in designing this curriculum.

We believe that this syllabus, crafted with the essence of the NEP 2020, will equip our students with the necessary skills and knowledge to excel in their future endeavours. We look forward to embarking on this exciting academic journey with our students.



S

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PROGRAM OUTCOMES

PO1	Engineering knowledge	Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO3	Design/development of solutions	Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO4	Conduct investigations of complex problems	Conduct investigations of complex engineering problems using research- based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
PO5	Engineering Tool Usage	Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
PO6	The Engineer and The World	Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
PO7	Ethics	Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO8	Individual and Collaborative Team work	Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO9	Communication	Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO10	Project Management and Finance	Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO11	Life-Long Learning	Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)
PSO1	Program Specific Skill	Ability to select and apply appropriate hardware and software tools to solve problems that require enhanced programming skills
PSO2	Program Specific Skill	Ability to develop IOT and cloud-based solutions for emerging societal problems
PSO3	Program Specific Skill	Ability to learn and apply industry 4.0 standards for solving industrial problems





KNOWLEDGE AND ATTITUDE PROFILE (WK)

WK1	A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.
WK2	Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
WK3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
WK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
WK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, reuse of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
WK6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
WK7	Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
WK8	Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
WK9	Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.



S

ABBREVIATIONS

ABC	: Academic Bank of Credit
AEC	: Ability Enhancement Course
AIT	: Army Institute of Technology
AWES	: Army Welfare Education Society
BSC	: Basic Science Course
CBCS	: Choice Based Credit System
CCC	: Co-Curricular Courses
CCE	: Comprehensive Continuous Evaluation
CEP	: Common Engineering Project
CIE	: Continuous Internal Evaluation
CO	: Course Outcome
СР	: Credit Points
ELC	: Experiential Learning Courses
ESC	: Engineering Science Course
ESE	: End Semester Examination
FP	: Field Project
HEI	: Higher Education Institutions
INT	: Internship
IKS	: Indian Knowledge System
IQAC	: Internal Quality Assurance Cell
MDM	: Multidisciplinary Minor
MOOC	: Massive Open Online Courses
MPUA	: Maharashtra Public Universities Act, 2016
MSDE	: Ministry of Skill Development and Entrepreneurship
MSFDA	: Maharashtra State Faculty Development Academy
NAAC	: National Assessment and Accreditation Council
NEP	: National Education Policy
NSDC	: National Skill Development Corporation
NSQF	: National Skills Qualification Framework
NSS	: National Service Scheme
NTA	: National Testing Agency
OE	: Open Elective
OJT	: On Job Training
PCC	: Program Core Course
PEC	: Programme Elective Course
PO	: Program Outcomes
PR	: Practical
PRN	: Permanent Registration Number
PRJ	: Project
PSO	: Program Specific Outcome
RM	: Research Methodology
SPPU	: Savitribai Phule Pune University
SSCs	: Sector Skill Councils
TH	: Theory
TU	: Tutorials
VEC	: Value Education Course
VSE	: Vocational and Skill Enhancement Course
VC	: Vice Chancellor
	Comp. Engg. Prof. (Dr.) S. R. Dhore

NEP 2020 Compliant Curriculum Structure

FIRST YEAR OF BTECH (COMPUTER ENGINEERING)

SEMESTER I

(WEF AY 2025-26)

	Level 4.5															
		Course Name	Teaching Scheme (Hrs./week)				Examination Schemeand Marks					eand	Credits			
CourseCode	Course Type		Lecture	Practical	Tutorial	Total	CIE	ESE	Term work	Practical	Oral	Total	Theory	Practical	Tutorial	Total
BCC25311A0A	BSC	Engineering Mathematics I	3	-	-	3	50	50	-	-	-	100	3	-		3
BCE25312A0A	BSC	Applied Sciences for Computer Engineering –I	3	-	-	3	50	50	-	-	-	100	3	-		3
BME25313A0A	ESC	Basic Mechanical Engineering and CAD	3	-	-	3	50	50	-	_	-	100	3	-		3
BCE25314A0A	ESC	Problem Solving Techniques	3	-	-	3	50	50	-	-	-	100	3	-		3
BCC25311A0C	BSC	Engineering Mathematics I Tutorial	-	-	1	1	-	-	25	-	-	25	-	-	1	1
BCE25312A0B	BSC	Applied Sciences for Computer Engineering –I Laboratory	-	2	-	2	-	-	25	-	-	25	-	1		1
BME25313A0B	ESC	Basic Mechanical Engineering & CAD Laboratory	-	2	-	2	-	-	25	-	-	25	-	1		1
BCE25314A0B	ESC	Problem Solving Techniques Laboratory	-	2	-	2	-	-	25	-	-	25	-	1		1
BCC25315A0X	VSEC, FP	Design Thinking & Ideation	1	2	-	3	50	-	25	-	-	75	1	1		2
BCC25316A0X	IKS	Indian Knowledge System	2	-	-	2	50	-	-	-	-	50	2	-		2
BCC25317A0X	VEC	Communication Skills and Human Values	1	-	1	2	50	-	25	-	-	75	1	-	1	2
BCC25318A0X	AC	Environmental Science	1	-	-	-	-	-	-	-	-	-	-	-		-
		Total	17	08	02	27	350	200	150	-	-	700	16	04	02	22



Prof. (Dr.) S. R. Dhore

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NEP 2020 Compliant Curriculum Structure

FIRST YEAR OF BTECH (COMPUTER ENGINEERING)

SEMESTER II

(WEF AY 2025-26)

	Level 4.5															
					Teaching Scheme (Hrs./week)				ation Ma	Sch rks	eme	eand	Credits			
CourseCode	Course Type	Course Name	Lecture	Practical	Tutorial	Total	CIE	ESE	Term work	Practical	Oral	Total	Theory	Practical	Tutorial	Total
BCE25321A0A	BSC	Engineering Mathematics II	3	-	-	3	50	50	-	_	-	100	3	-	-	3
BCE25322A0A	BSC	Applied Sciences for Computer Engineering-II	3	-	-	3	50	0 50 100		3	-	-	3			
BCE25323A0A	ESC	Foundation of Object-Oriented Programing	3	-	-	3	50	0 50 100			3	-	-	3		
BEC25324A0A	ESC	Basic Electrical & Electronics Engineering3-35050		-	-	-	100	3	-	-	3					
BCE25321A0C	BSC	Engineering Mathematics II Tutorial	-	-	1	1	-	-	25	-	-	25	-	-	1	1
BCE25322A0B	BSC	Applied Sciences for Computer Engineering –II Laboratory	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BCE25323A0B	ESC	Foundation of Object-Oriented Programing Laboratory	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BEC25324A0B	ESC	Basic Electrical & Electronics Engineering Laboratory	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BCC25325A0X	VSEC, PRJ	Design Thinking, Innovation and Prototyping	1	2	-	3	50	-	25	-	-	75	1	1	-	2
BCC25326A0X	HSSM	Entrepreneurship skills & Professional Ethics	2	-	1	3	50	-	50	-	-	100	2	-	1	3
BCC25327A0X	CC	Life skills & Liberal learning	-	2	-	2	-	-	25	-	-	25	-	1	-	1
BCC25328A0X	AC	The Constitution of India	1	-	-	-	-	-	-	-	-	-	-	-	03	-

• CC: Liberal Learning: Music/Photography/Painting/Calligraphy

• Life skills: NCC/NSS



Computer Engineering, AIT Pune

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ARMY INSTITUTE OF TECHNOLOGY, PUNE

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B. Tech Computer Engineering Department

Semester - I



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(With effect from Academic Year 2025-26)

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BCC25311A0A: Engineering Mathematics I (Linear Algebra and Calculus)									
Teaching Schen	ne:	Credi	t Exan	nination Scheme:					
Theory: 03 hrs.	/ week	03	CIE: 50 Marks ESE: 50 Marks						
Prerequisite Co	Prerequisite Courses, if any: Elementary Mathematics & Elementary Calculus								
Companion Co	urse, if any: NA								
Course Objective To understand To understand To understand To understand To understand	 Course Objectives: To understand and familiarize with concepts of linear algebra To understand and apply series expansion of functions To understand and apply basics of differential equations To understand and apply basics of vector differentiation To understand basics of vector integration and apply to solve engineering problems 								
Course Outcom CO1: Understand CO2: Determine and McLau CO3: Apply the e CO4: Apply vector CO5: Apply vector	 Course Outcomes: On completion of the course, learner will be able to - CO1: Understand and apply the concept of rank to find Eigen values and Eigen vectors CO2: Determine the representation of a function in an infinite series using successive differentiation, Taylor's and McLaurin's theorems CO3: Apply the effective mathematical tools for solving ordinary differential equations CO4: Apply vector differentiations to analyze the vector fields CO5: Apply vector integration and analyze the vector fields 								
	Γ	Course C	ontents		1				
Unit I		Linear	Algebra		(8 Hrs)				
Rank, System of transformations, E	linear equations with bigenvalues, Eigen vector	applications, Lin tors, applications.	ear dependence an	d independence of	vectors, Linear				
Mapping of Cour	rse Outcomes with PC	Os & PSOs	PO1, PO2, PO3, 2	PO4, PO5, PSO1, PS	SO2, PSO3				
Unit II		Calc	culus		(8 Hrs)				
Successive Differe (DUIS), Taylor's s	entiation and Leibnitz series, Maclaurin's seri	theorem, Beta and es. Time Series F	d Gamma functions unctions.	, differentiation und	er integral sign				
Mapping of Cour	rse Outcomes with PC	Os & PSOs	PO1, PO2, PO3,	PO4, PO5, PSO1, PS	SO2, PSO3				
Unit III		Different	ial Equations		(8 Hrs)				
Ordinary Different equations reducibl Linear Different Particular Integra Legendre's DE, Si	ential Equations: Lin le to Exact form ial Equations: LDE I, General method, S imultaneous and Symm	near Differential of nth order w Short methods, netric simultaneou	Equations, Exact ith constant coeff Method of variati us DE.	differential equation icients, Complemen on of parameters,	tary Function, Cauchy's and				
Mapping of Cour	rse Outcomes with PC	Os & PSOs	PO1, PO2, PO3, PO	04, PO5, PSO1, PSO2	, PSO3				
Unit IV		Vector D	ifferentiation		(8 Hrs)				
Physical interpreta Directional deriva	ation of Vector differentive, Solenoidal, Irrota	ntiation, Vector di tional and Conser	ifferential operator, vative fields, Scala	Gradient, Divergend r potential, Vector id	e and Curl, lentities.				
Mapping of Course Outcomes with POs & PSOsPO1, PO2, PO3, PO4, PO5, PSO1, PSO2, PSO3									
Unit V	Unit VVector Integration(8 Hrs)								
Line, Surface and theorem. Applicat	Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence theorem, Stoke's theorem. Applications to problems in Electro-magnetic fields.								
Mapping of Cour	Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO3, PO4, PO5, PSO1, PSO2, PSO3								
Comp. Engg									
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Learning Resources

Text Books:

- 1. B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill
- 2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publication, Delhi

Reference Books:

- 1. Erwin Krey zig, "Advanced Engineering Mathematics", Wiley Eastern Ltd.
- 2. M. D. Greenberg, "Advanced Engineering Mathematics", Pearson Education
- 3. Peter V. O'Neil, "Advanced Engineering Mathematics", Thomson Learning
- 4. George B. Thomas, "Thomas' Calculus", Addison-Wesley, Pearson

MOOC / NPTEL Courses/Other Resources:

- 1. https://youtu.be/9h_Q-R6sXbM?si=Nqz81D-JajSpAMv1
- 2. https://youtu.be/ksS yOK1vtk?si=vNsF2s9nG9Ces 10
- 3. https://youtu.be/NBcGLLU90fM?si=YfonBLq6fG2sopxJ
- 4. https://youtu.be/ksS yOK1vtk?si=kW YOORW8RIVRLto

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BCC25311A0C: Engineering Mathematics I Tutorial									
Teaching Scheme:	Teaching Scheme:CreditExamination Scheme:								
Practical: 01 hr. / week	Practical: 01 hr. / week 01 Term Work: 25 Marks								
Prerequisite Courses, if any: 1. Elem	nentary Mathematics 2	Elementary Calculus							
Companion Course, if any: Linear A	lgebra and Calculus								
Course Outcomes:									
On completion of the course, learne	er will be able to-								
CO1: Understand and apply the cond	cept of rank to find Eiger	n values and Eigen vectors							
McLaurin's theorems	unction in an infinite set	tes using successive differentiation, Taylor's and							
CO3: Apply the effective mathematica	al tools for solving order	ordinary differential equations							
CO4: Apply vector differentiations to	analyze the vector field	S							
CO5: Apply vector integration and an	alyze the vector fields								
G G	uidelines for Student	's Tutorials							
1. Will be given centrally	idalinas fan Lah /TW	Aggoggmont							
For TW assessment - weigh	tage given to	Assessment							
1. Attendance	tage given to								
2. Completion of Assignment									
3. In time Submission									
Guidelines for Laboratory Conduction									
1. Will be given centrally									
I	List of Laboratory Ex	periments							
	Unit I - Linear Alg	gebra							
I Obtain Eigen values and Eigen ve	ctors using suitable soft	ware tools							
	Unit II – Calcu	llus							
2 Find series expansion of function suitable software tools	ns with the help of succ	essive differentiation and Taylor's series using							
I	Unit III- Differential	Equations							
3 Solve any one:	1.00								
1. Solve problems of ordinar	ry differential equations	of first order and first degree.							
2. Solve problems of intear of	Unit IV- Vector Diffe	rentiation							
4 Use various vector differentiation	techniques to analyze/id	entify vector fields							
	Linit V- Vector Inte	agretion							
5 Use various vector integration teal	hniques to analyze/ident	ify vactor fields							
Text Backer	iniques to analyze/ident	ity vector fields							
1 D V Domono "Higher Engine	aaring Mathamatics" To	to McCrow Hill							
2 B S Grewal "Higher Engine	ering Mathematics" Kh	unna Publication Delhi							
Reference Books:	ing wathematics, Kin	unia i ubication, Denn.							
1. Erwin Krey zig, "Advanced Er	ngineering Mathematics	', Wiley Eastern Ltd.							
2. M. D. Greenberg, "Advanced 1	Engineering Mathematic	s", Pearson Education							
3. Peter V. O'Neil, "Advanced E	ngineering Mathematics	", Thomson Learning							
4. George B. Thomas, "Thomas'	Calculus", Addison-We	sley, Pearson							
Useful Links/Resources:									
1. <u>https://youtu.be/9h_Q-R6sXbM</u>	<u>M?si=Nqz81D-JajSpAM</u>	vl							
2. <u>https://youtu.be/ksS_yOK1vtk</u>	?si=vNsF2s9nG9Ces_10	<u>0</u>							
3. <u>https://youtu.be/NBcGLLU901</u>	fM?si=YfonBLq6fG2so	<u>oxJ</u>							
4. <u>https://youtu.be/ksS_yOK1vtk</u>	<u>:/s1=kW_YOORW8RIV</u>	<u>KLto</u>							
	E Dept. of	(Dr) S. P. Dhore							

PUNE-15

BCC2531A0A: Applied Science for Computer Engineering-I									
Teaching Scheme:		Cred	it	Exam	ination Schem	ne:			
Theory: 03 hrs. / week		03		CIE: ESE:	50 Marks 50 Marks				
Prerequisite Courses, if any	: -								
Companion Course, if any: -									
 Course Objectives: To introduce the principles and methodologies of computational approaches for solving chemical problems and provide knowledge of molecular modeling. To enable students to analyze and interpret chemical and biological information through computational methods. To understand the interface of biology and computing for innovations in bioinformatics and computational biology. To highlight recent advancements in smart, functional, and biomaterials in engineering and develop the ability to choose appropriate materials for specific engineering applications. To develop skills in solving real-world problems using advanced instrumentation and enable the application of these techniques in industrial, academic, and research environments. Course Outcomes: On completion of the course, learner will be able to - CO1: Remember fundamental principles of computational chemistry, including molecular modeling, quantum chemistry, and molecular dynamics. CO2: Understand Fundamental concepts cheminformatics software and databases for molecular visualization, data retrieval, and chemical informatics applications. CO3: Apply Biological Data utilize computational techniques to analyze biological data, such as DNA sequencing, protein structures, and biological networks. CO4: Analyze- Nanomaterials and Polymers, synthesis, properties, and applications of nanomaterials, 									
CO5: Evaluate the role of ins monitoring, nanotechnolog	trument	al techniques in food analysis.	industries sucl	h as ph	narmaceuticals,	environmental			
		Course Co	ntents						
Unit I		Comput	ational Chen	nistry		(08 Hrs)			
Introduction to Computational C limitations of computational me docking. Energy minimization te Applications of Computational design and discovery, and Spectr	hemistry thods. I chnique Chemist oscopic	y and its importance Molecular Modelli ss. ry, Molecular stru property predictio	e in modern re ng Techniques cture predictio n. Emerging Tu	search a Geor n, Reac rends in	and industries. A netry optimizati tion mechanism Computational	Advantages and ion, Molecular a studies, Drug Chemistry.			
Mapping of Course Outcomes	with PC)s & PSOs	PO2, PO5, PS	O1, PS	02				
Unit II		Cheminfo	rmatics			(8 Hrs)			
Introduction to Cheminformati representations. Chemical Datab Computational Tools in Chemin and Environmental chemistry.	cs, His ases. Me formatio	torical developme olecular Descriptor cs, Applications of	nt and evolut s and Fingerpr Cheminforma	ion. M ints. tics: Ma	olecular structu	ares and their nd engineering			
Mapping of Course Outcomes	with PC	Os & PSOs	PO1, PO2, PC	04, PSO	1				
Unit III	<u> </u>	Biological	Computing	7 11		(8 Hrs)			
Differences between Classical Com Models, Molecular Computing, I Applications of Biological Comp storage. Environmental applicati	Differences between Classical Computing, Historical Development and Milestones in Biological Computing. Differences between Classical Computing and Biological Computing. Biological Systems as Computational Models, Molecular Computing, Bio-computational Hardware. Applications of Biological Computing: Biological data storage: DNA as a medium for high-density information storage. Environmental applications: Biosensors for detecting pollutants, and monitoring ecosystems.								
Mapping of Course Outcomes	with PC	Ds & PSOs	PO1, PO3, PO	04, PO5	, PO6, PO7, PS0	O1, PSO2			
Computer Engineering, AIT F	Computer Engineering, AIT Pune Prof. (Dr.) S. R. Dhore Head of Computer Department Army Institute of Technology Dighi Hill's,Pune - 15. Page 14 of 63								

Syllabus for First Year Engineering (2025 Pattern)

Unit IV Advanced Engineering Materials (8 Hrs) Nanomaterials: Introduction, and classification of nanomaterials based on dimensions. Structure and applications of graphene, fullerene, carbon nanotubes, and quantum dots (semiconductor nanoparticles). Polymers: Introduction and classification based on thermal behavior, Specialty polymers: Introduction, properties, and applications. Conducting Polymer, Polymer nanocomposites, and Liquid Crystal Polymer. Applications of polymer in engineering. Mapping of Course Outcomes with POs & PSOs PO1, PO2, PO4, PO6, PSO2, PSO3 Unit V **Advanced Instrumental Technique** (8 Hrs) UV-Visible Spectroscopy: Introduction, statement of Beer's law and Lambert's law, Electronic transitions in an organic molecule, terms involved in UV-visible Spectroscopy, instrumentation (double beam), and applications. Infra-red Spectroscopy: Introduction, Principle, and types of vibrations: Stretching (symmetric and asymmetric) and bending (scissoring, rocking, wagging, and twisting), conditions of absorption of IR radiations, Instrumentation, and Applications. X-Ray Diffraction: Introduction, Generation of X-Ray, and Principle. X-ray diffraction Techniques: Single crystal X-ray diffraction, Powder, X-ray diffraction (PXRD), Instrumentation, and applications. Mapping of Course Outcomes with POs & PSOs PO1, PO3, PO5, PO6, PO7, PSO2, PSO3 **Learning Resources Text Books:** 1. Textbook of Engineering Chemistry by Dr. S. S. Dara, Dr. S. S. Umare, S. Chand & Company Ltd. 2. Engineering Chemistry by O. G. Palanna, Tata Magraw Hill Education Pvt. Ltd. 3. Textbook of Engineering Chemistry by Dr. Sunita Rattan, S. K. Kataria& Sons Publisher. **Reference Books:** 1. Basic Concept of Analytical Chemistry, 2ed, S. M. Khopkar, New Age-International Publisher. 2. Instrumental Methods of Chemical Analysis, G. R. Chatwal& S. K. Anand, Himalaya Publishing House. 3. Spectroscopy of organic compounds, 2ed, P. S. Kalsi, New Age-International Ltd., Publisher. 4. Polymer Science, V. R. Gowarikar, N. V. Viswanathan, jayadev Sreedhar, Wiley Eastern Limited. 5. Fundamentals of Nanotechnology, G. L. Hornyak, J. J. Moone, H. F. Tihhale, J. Dutta, CRC press **MOOC / NPTEL Courses/Other Resources:** 1. Advanced Computational Techniques: https://onlinecourses.nptel.ac.in/noc25_ma01/preview 2. Computational process design: https://onlinecourses.nptel.ac.in/noc25_ch47/preview 3. Polymer Reaction Engineering: https://onlinecourses.nptel.ac.in/noc25 ch38/preview 4. Chemical Process Technology: <u>https://onlinecourses.nptel.ac.in/noc25_ch15/preview</u>

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HOME

BCC25311A0B: Applied Science for Computer Engineering-I Laboratory									
Teachi	ing Scheme:	Credit	Examination	Scheme:					
Practic	cal: 02 hrs. / week	01	Term Work:	25 Marks					
Prereg	uisite Courses, if any:								
Compa	anion Course, if any:								
Course	e Outcomes:								
On con	npletion of the course, learner	r will be able to-							
CO1: C	CO1: Correlate principles of chemistry to everyday and complex engineering problems.								
CO2:1	Think out of box with the solid f	oundation of chemistry to sol	ve engineering prol	blems.					
	Gui	delines for Student's Lab	Journal						
1. Dra	w the diagram on the left side o	f the first page, in front of air	n in pencil, on a bla	ank page.					
2. The	e observations will be written on	blank age with a pencil, foll	owed by the calcula	ations on the same page.					
3. The	e graph will face the observation	table. Show slope and any re	elated calculations of	on the graph, in pencil.					
	Gui	idelines for Lab /TW Ass	essment						
1. 15 1	marks for the lab/journal work,	which includes 05 marks for	timely submission/j	practical completion, 05					
inte	erest shown while performing the	e practical and 05 marks for f	file writing, calcula	tions etc.					
2.051	marks for theory attendance.								
3. 05 1	marks for class seminars/viva.	J. K	J4'						
1 Car	Gui Gui	charactery Co	onduction						
1. Col 2 Ens	sure the file is checked regularly	aboratory.							
2. Ens 3. Get	the circuit verified before switc	ching on the apparatus/circuit							
4. Do	not enter the lab/work in the lab	without an instructor.							
	I	ist of Laboratory Experi	ments						
	I	Group A (Any two)							
1	Molecular Structure Visualiza	ation and Optimization using	Chemdraw softwar	e					
2	Synthesis and characterization	n of Polystyrene polymer.							
3	Basic Reaction Mechanism and	nd its Simulation using Chem	idraw software						
		Group B (Any two)							
1	Synthesis of Quantum dots na	anoparticles (2-6 or 3-5 semic	conductor).						
2	Synthesis and Characterization	on of Conducting Polymer (po	olyaniline or polypy	vrrole).					
3	Compute and analyze molecu	lar descriptors of given organ	nic molecules using	computational tools.					
		Group C (Any three)							
1	Characterization of the Optica	al Properties of Nanomaterial	s Using UV-Vis Sp	pectroscopy					
2	Synthesis and characterization	n of Phenol Formaldehyde po	olymer.						
3	Protein Folding and Structura	l Stability							
4	Biosensor Development for s	ustainability							
		Group D (Any three)							
1	Structure-Activity Relationsh	ip (SAR) Studies.							
2	DNA Hybridization and Dete	ction.							
3	Spectroscopic Calculations (I	R and UV-Vis).							
4	Practical on Biological Comp	outing							
Useful	l Links/Resources:								
1.	MERLOT Virtual Labs: Chem	<u>iistry</u>							
2.	https://nptel.ac.in/courses/103	107206	0						
3.	https://nptel.ac.in/courses/103	10/201	\mathcal{O}'						
		Dept. of Comp. Engg.)	Dr.) S. R. Dhore						

BME25313A0A: Basic Mechanical Engineering and CAD									
Teaching Scheme: Credit Examination Scheme:									
Theory: 03 h	rs. / week	03		CIE: 50 Marks					
Prerequisite Courses, if any: Physics, Chemistry, Mathematics									
Companion (Course, if any: NA	<u>196108</u> , 01101118019	,	<u> </u>					
Course Obje	ctives:								
• To know th	ne principle, methods,	possibilities and lim	itations of The	rmal Engineering and its	applications.				
 To underst To be formi 	and the importance of	products, their Desi	gn consideratio	ns with respect to the app	olications.				
 To be family technologie 	es and the machine to	ols used.	t materials thos	e are used in Manufactur	ing				
• To explore	the potential of Com	outer Aided Design a	and Drafting (C	ADD) and its application	s.				
Course Outc	omes: On completion	on of the course, lea	arner will be a	ble to -					
CO1: Unders	stand the fundamental	s of thermodynamics	s and Heat trans	fer					
CO2: Unders	stand the applications	of Thermal Engineer	ring.						
CO3: Unders	stand the Production F	Intering and its applications and its a	nnlications						
CO5: Unders	stand the Computer Ai	ided Design and Dra	fting (CADD) a	and its applications.					
	1		ontents	11					
Unit I		Thermal Fr	gineering		(06 Hrs)				
Thermodynan	nics. Laws of thermoo	ivnamics Heat engi	ne Heat numn a	and Refrigerator	(00 1113)				
Heat Transfer	r: Modes of heat tra	insfer with applicati	ons, Fourier's	law, Newton's law of c	cooling, Stefan				
Boltzmann's la	W	11	,	,	6,				
Transportatio	n: Two stroke and F	our stroke engines (Petrol, Diesel a	and CNG engines), Elect	ric and Hybrid				
Vehicles									
Mapping of C	ourse Outcomes with	POs & PSOs	PO1-PO7	•					
Unit II		oplications of The	rmal Enginee	ering	(8 Hrs)				
Energy Source Wind energy, H	es: Thermal energy, Hydrogen energy, Bio	Hydropower energy mass energy and Tid	y, Nuclear ener lal energy. Grad	rgy, Solar energy, Geoth les of Energy	iermal energy,				
Energy Conve	ersion Devices: Boiler	r, Pump, Compresso	r, Turbine, I.C.	engines, Fans, Blowers, I	HVAC System,				
Household Ref	rigerator, Window Ai	r Conditioner	r Goothormal	Wind Hydrogon Tidal	Biomass and				
Hybrid Power	Plants.	Julic, Nuclear, Sola	i, Geomermai,	wind, Hydrogen, Tidai,	, biomass and				
Mapping of C	ourse Outcomes with	n POs & PSOs	PO1-PO7						
Unit III		Design E	ngineering		(9 Hrs)				
Machine elem	ents: Power transmis	sion elements (shaft	ts, axles, keys,	bush and ball bearings, J	loint, universal				
joint, Springs a Power Transr	ind Dampers, Valves, nission Devices. Beli	Levers), Flywheel and the drives Chain drives Chain drives Chain drives and the drives are drives and the drives are drives and the drives are	nd Governors ve Gears Cou	plings Clutch Brakes A	Applications of				
these devices				p	approvidence of				
Mechanisms:	Slider crank/ IC Eng	gine mechanism, Fo	our bar chain 1	mechanism and its inver	sions, Geneva				
Mapping of Co	urse Outcomes with PO	Ds & PSOs	PO1-PO7, 09						
Unit IV		Production	Engineering		(9 Hrs)				
Material Scien	nce: Materials used i	n Engineering and	their applicatio	ns, Metals (Ferrous and	Non-Ferrous),				
Nonmetallic m	aterials, Material selec	ction criteria	1						
Sheet metal wo	Manufacturing Science: Introduction to manufacturing processes and their applications, Carpentry, Casting, Sheet metal work Forging Metal Forming Metal Joining Machining								
Machine Tools: Working principle and types of operations of Lathe Machine, Milling Machine, Drilling									
Machine, Powe	er saw, Grinding mach	nine, NC and CNC m	nachines, 3D Pr	inters					
wapping of C	ourse Outcomes with	I PUS & PSUS	$\frac{POI-PO/,09}{Prof(Dr)}$	S. R. Dhore					
Computer En	gineering AIT Pune	IIS (Comp. Engg.)	Head of Co	mputer Department	Page 17 of 63				
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τ	J nit V	Computer Aided Design and Drafting (CADD)	(10 Hrs)							
Sketch Introdu applica Princip Introdu generat	Sketching of engineering objects and interpretation of drawings as a visualization and communication tool, introduction to Computer aided Graphics, Introduction to Computer Aided Drafting (CAD) packages application for both 2D and 3D computer-aided design (CAD) and drafting, Basic Operations/Commands, Principal Views, Dimensioning, Editing, Modifying, Printing/Plotting CAD entities/Drawing sheets, Introduction to 3D primitives, Creating 3D components through the use of a CAD package. Simple assemblies, generation of assembly views from part drawings, animation of simple assemblies.Mapping of Course Outcomes with POs & PSOsPO1-PO7, 10, 11									
		Learning Resources								
Text	Books:									
1	Nag P K	"Engineering Thermodynamics " Tata McGraw-Hill Publisher Co. Ltd								
2.	Chaudhari a Publishers	and Hajra, "Elements of Workshop Technology", Volume I and II, Media Pror Mumbai	moters and							
3.	Agrawal, Ba Sons, USA	asant and Agrawal, C. M., (2008), "Basics of Mechanical Engineering", John	Wiley and							
4.	Raiput, R.K	., (2007), "Basic Mechanical Engineering", Laxmi Publications Pvt. Ltd.								
5.	Pravin Kum	par. (2018). "Basic Mechanical Engineering, 2nd Ed.". Pearson (India) Ltd.								
6.	Moran, M. J Thermodyna	J., Shapiro, H. N., Boettner, D. D., and Bailey, M. "Fundamentals of Engineer amics". Wiley	ing							
7.	Surinder Ku	umar. (2011), "Basic of Mechanical Engineering". Ane Books Pyt. Ltd. New I	Delhi							
8.	Bethune, J.I 1995.	D., "Engineering Graphics with AutoCAD," Prentice Hall, Englewood Cliffs,	First Edition,							
Refer	ence Books:									
1.	Khan, B. H.	, "Non-Conventional Energy Sources, Tata McGraw-Hill Publisher Co. Ltd.								
2.	Boyle, Godf	frey, "Renewable Energy", 2nd Ed., Oxford University Press								
3.	Khurmi, R.S.	S., and Gupta, J. K., "A Textbook of Thermal Engineering", S. Chand & Sons								
4.	Incropera, F Wiley and S	F. P. and Dewitt, D.P., (2007), "Fundamentals of Heat and Mass Transfer, 6th Sons, USA	Ed., John							
5.	Groover,Mi Systems", P	kell P., (1996), "Fundamentals of Modern Manufacturing: Materials, Processe Prentice Hall, USA	es, and							
6.	Norton, Rob	pert L., (2009), "Kinematics and Dynamics of Machinery", Tata McGrawHill								
7.	Cleghorn, W	V. L., (2005), "Mechanisms of Machines", Oxford University Press								
8.	Juvinal, R. (C., (1994), "Fundamentals of Machine Component Design", John Wiley and S	Sons, USA							
9.	Ganeshan, V	V., (2018), "Internal Combustion Engines", McGraw Hill								
10	. Anderson, C	Curtis Darrel and Anderson, Judy, (2010), "Electric and Hybrid Cars: A History	y", 2nd Ed.,							
	McFarland									
11.	. Jolhe, D. A. Delhi	, (2015), "Engineering Drawing with introduction to AutoCAD", Tata McGra	w Hill, New							
12	. Lani Tran, (Standards to	2024), "Mastering Modern CAD Drawings with SOLIDWORKS 2024: Apply Definition Drawings", SDC Publications	ying ASME							

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BME25313A0A: Basic Mechanical Engineering and CAD Laboratory					
Teachi	ing Scheme:	Credit	Examination Scheme:		
Practio	cal: 02 hrs. / week	01	Term Work: 25 Marks		
Prereg	uisite Courses, if any: Phy	sics, Chemistry, Mathema	tics		
Course	e Objectives:				
1. To	know the principle, methods, p	ossibilities and limitations of T	Thermal Engineering and its applications.		
2. To	understand the importance of p	roducts, their Design consider	ations with respect to the applications.		
3. To	be familiar with the charac	teristics of the different ma	aterials those are used in Manufacturing		
tech	nologies and the machine tools	s used.			
4. 10	explore the potential of Compu	ter Aided Design and Drafting	g (CADD) and its applications		
Course On com	e Outcomes: Indetion of the course dearner w	vill be able to_			
CO1:	Understand the fundamentals of	of thermodynamics and Heat the	ransfer		
CO2:	Understand the applications of	Thermal Engineering.			
CO3:	Understand the Design Engine	ering and its applications.			
CO4:	Understand the Production Eng	gineering and its applications.			
CO5:	Understand the Computer Aide	ed Design and Drafting (CAD	D) and its applications.		
]	List of Laboratory Experi	ments		
1.	Study of Energy sources (Minimum one Conventional and one Nonconventional sources).				
2.	Study and demonstration of energy conversion devices.				
3.	Study and demonstration of Electric and Conventional IC engine vehicles, their specifications and systems				
4.	Study and demonstration of P	ower Plants.			
5.	Study and demonstration of Domestic appliances viz. refrigerator, air-conditioner, washing machine, cold storage.				
6.	Study and demonstration of p	ower train/gear box system in	the vehicle or machine tool.		
7.	Study and demonstration of P	ower Transmission Devices.			
8.	Study and demonstration of vehicle systems (automobile chassis, steering system, suspension system, braking system - Any Two).				
9.	Study and demonstration of additive manufacturing / rapid prototyping techniques and machines.				
10.	Study and demonstration of C	NC machines.			
11.	Visit to any Manufacturing In	dustry.			
12.	2D Drafting of PCB / Heat Si	nks / any Electrical/Electronic	components.		
13.	3D Modeling of PCB / Heat S	Sinks / any Electrical/Electroni	c components.		
14.	Visit to any Service Industry				

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BCE25314A0A: Problem Solving Techniques					
Teaching Scheme:	: Credit Examination Scheme:				
Theory: 03 hrs. / week	02	CIE	CIE: 50 Marks		
	03	ESE	: 50 Marks		
Prerequisite Courses, if any: - E	asic Mathematic	S			
Companion Course, if any: -					
Course Objectives:					
• Learn basic principles of program	nming languages &	programming parac	ligms.		
• Understand various problem-se	olving frameworks	such as Scientifi	c Method, Design	Thinking, and	
Engineering Design Process					
• To understand the fundamental C	Concepts of C Progr	amming			
• To design a solution using Array	s, Character and Str	ing Arrays in C pro	gramming		
• To design a develop solution	for simple comput	ational problems u	ising User Defined	Functions and	
Structures in C Programming	6.4				
CO1: Utilize analytical tools & tech	bit the course, learner v	will be able to -			
CO^2 : Illustrate the use of algorithm	in solving Fundame	ntal Computational	Challenges		
CO3: Apply the concept of Contr	ol Flow Structures	and user defined	data types to solv	e the practical	
Problems.		und 0501 0011100		- and provide	
CO4: Apply the concept of user defi	ned function & poir	nters.			
CO5: Analyze the concepts of file &	apply it while stori	ng & retrieving the	data from secondary	storages.	
	Course (Contents		<u> </u>	
Unit I Funds	mentals of Prog	ramming (CO1, 0	CO2)	(7 Hrs)	
Problem Solving and Logic: Skills and Soft Skills. Problem and Type Problem. Examples of Computation Problem, Optimization Problem, Pro	required for a softw s of Problem: Soc al Problems: Decisi blem-solving Life C	ware engineer: Tech ial Problem, Manag on Problem, Search Cycle.	nical Skills, Problem gement Problem and ing and Sorting Prob	n Solving Skills Computational blem, Counting	
Logic: Importance of Logic in Pro-	blem Solving, Pos	itive logic, Negati	ve logic. Problem	Solving Tools:	
Algorithms, Flowcharts.					
Introduction to computer-based p	roblem solving: In	portance of Studyin	ng Programming Lan	guages, Impact	
of Role of Programming Languages	Programming Env	ironments. Progran	design and implem	entation issues,	
Pseudocodes.	T				
Case Study	D	eveloping a Studen	t Performance Analy	sis System	
Mapping of Course Outcomes with	POs & PSOs P	O1, PO2, PO3, PO4	, PO5, PO9, PO10		
Unit IIIntroduction to C Programming (CO1)(8 Hrs)					
Programming Fundamentals: Structure of C program, Header files and preprocessor directives. Compiler,					
Interpreter, Assembler, Loader, Linker. Writing and executing the first C program. Syntax and logical Errors,					
Object and executable code.					
Tokens in C: Identifiers, Keywords (Variable declaration, initialization and manipulation of data.), Constants,					
Strings, Operators, special symbols.					
Data types: Primary (Integers, floats, characters, double etc.), Secondary and User Defined data types.					
Operators and expressions: Arithmetic Operators, Relational Operators, Logical Operators, Bitwise					
Operators, Conditional Operators (1)	ernary Operator),	Assignment Operat	or, Special operators	formation and	
evaluation Type Casting					
evaluation., Type Casting.					
Case Study Developing a Unit Conversion System					
Mapping of Course Outcomes with	PUS & PSOS	O1, PO2, PO3, PO3	5		
(S(Comp. Eng.)) Prof. (Dr.) S. R. Dhore					

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Unit III	Control Flow & User Defin	ed Data Types in Program (CO3)	(8 Hrs)		
Decisions making u	sing if, if-else, nested if-else, else-	if ladder, switch-case, goto, continue and b	reak statement.		
Iterative Loops: for	r, while and do-while loop, nested	loops, Comparison of different loops.			
Arrays: Array Def	inition, Declaration, initialization	n and memory representation. 1D Array,	2D array and		
multidimensional ar	ray. Array arithmetic and address	calculation, Array Manipulation (Searching	g & Sorting)		
Strings: Declaration	n, Initialization and memory repre-	esentation of string. Operations on strings	(string length,		
string copy, string co	oncatenation, reverse string).				
User Defined Data	types: structures, Unions, Enumer	rated types & typedef.			
Case Study		 Sorting Techniques (like Bubble, Sele Student Enrolment System 	ction)		
Mapping of Course	e Outcomes with POs & PSOs	PO1, PO2, PO3, PO4, PO5, PO6			
Unit IV	Subroutine	& Pointers (CO4)	(9 Hrs)		
Functions in C: De	eclaration, Definition, function cal	l statement. Types of functions (User defin	ned and library		
function. Different I	Parameter passing and returning va	alues from functions. Concept of call by va	lue and call by		
reference. Array as a	a function parameter, returning arr	ay from function.			
Recursion: Definiti	on, declaration of recursive function	tion, implementing recursion to solve pro-	blems, such as		
factorial of given nu	mber and Fibonacci series.				
Pointers: Definitio	n, Declaration, applications of p	ointers. Pointer arithmetic, Pointer to an	ray, Pointer to		
Function, Dynamic	memory allocation (malloc, calloc,	, realloc and free functions).			
Case Study		Simulation of memory allocation and deallo	cation using the		
Case Study		perform various operations.	inc size, and the		
Mapping of Course	e Outcomes with POs & PSOs	PO1, PO2, PO3, PO4, PO5, PO6			
Unit V	File Handling &	Pre-processors (CO4,5)	(8 Hrs)		
File Handling: Da	ta Organization, File Operations:	Opening a File, reading from a File, Cl	osing the File,		
Counting Character	s, Tabs, Spaces, Writing to a File,	, File-copy, etc. File Opening Modes, Strin	ng (line) I/O in		
Files, Record I/O in	Files, Text Files and Binary Files.				
Preprocessor Direc	ctives and Macros. Macro Types,	, using macros for code optimization, Erro	r Handling and		
Debugging Techniq	ues, Implementing error handling	strategies			
Case Study		Student Marksheet Records Management	System		
Mapping of Course	e Outcomes with POs & PSOs	PO1, PO2, PO3, PO4, PO5, PO6, PO9			
	Learning	g Resources			
Text Books:					
1. R. G. Drom	ey, "How to solve it by Computer'	', Pearson Education, ISBN 0-13-433995-9			
2. Brian W. Ke	2. Brian W. Kernighan & Dennis M. Ritchie, "The C Programming Language", ISBN 0-13-110362-8				
3. E. Balaguru	3. E. Balagurusamy, Programming in ANSIC, 8e, TMcGraw-Hill Publishing.				
4. Yashavant Kanetkar, "Let us C" 16e, BPB Publications.					
Reference Books:					
1. Programming and Problem-Solving Using C, International Software Research and Development (ISRD					
Group), Luc	Group), Lucknow, TMcGraw-Hill Publishing, ISBN 13: 978-0-07-066760-0				
2. Maureen Sprankle, "Problem Solving and Programming Concepts", Pearson Education					
3. Steve McCo	3. Steve McConnell, "Code Complete", ISBN 978-0735619678				
4. Stephen G.	4. Stephen G. Krantz, "Problem Solving Techniques", Universities Press.				
5. V. Rajarama	an, "Computer Programming in 'C	", Prentice Hall			
6. Robert C. M	6. Robert C. Martin, "Clean Code: A Handbook of Agile Software Craftsmanship"				
MOOC / NPTEL Courses/Other Resources:					
1. Problem Solving Through Programming in C by Prof. Anupam Basu from IIT Kharagpur					
	2. Introduction to Programming In C by Prof. Satyadev Nandakumar from IIT Kanpur				
2. Introductio	n to Programming In C by Prof	. Satyadev Nandakumar from IIT Kanp	ur		

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BCE25314A0B: Problem Solving Techniques Laboratory

Teaching Scheme:	Credit	Examination Scheme:
Practical: 02 hrs. / week	01	Term Work: 25 Marks

Prerequisite Courses, if any: Basic Mathematical concepts.

Companion Course, if any:

Course Outcomes:

On completion of the course, learner will be able to-

CO1: Use algorithms on various linear data structure using sequential organization to solve real life problems. CO2: Analyze problems to apply suitable searching and sorting algorithm to various applications.

Guidelines for Instructor's Manual

The instructor 's manual is to be developed as a hands-on resource and reference. The instructor's manual needs to include prologue (about Program/ Institute/ department/foreword/ preface etc.), Course Syllabus, POs, PSOs, Cos, CO-PO-PSO mapping, Assignment mapping with CO, PO and Blooms taxonomy mapping, conduction & Assessment guidelines, topics under consideration concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

Guidelines for Student's Lab Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign, Theory- feature/Concept in brief, algorithm, flowchart, test cases, conclusion/analysis. Program codes with sample output of all performed assignments are to be submitted as softcopy.

As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers as part of write-ups and program listing to journal may be avoided. Use of DVD/One Drive Directory containing students' programs maintained by lab subject In charge is highly encouraged. For reference one or two journals may be maintained with program prints at Laboratory.

Guidelines for Lab /TW Assessment

Continuous assessment of laboratory work is done based on overall performance and lab assignments performance of student. Each lab assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Guidelines for Laboratory Conduction

The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. The assignment framing policy need to address the average students and inclusive of an element to attract and promote the intelligent students. The instructor may set multiple sets of assignments and distribute among batches of students. Encourage students for the use coding standards such as appropriate use of Hungarian notation, proper Indentation and comments. Use of open-source software is encouraged. Instructor may also assign one real life application in the form of a micro-project. Based on the concepts learned.

List of Laboratory Experiments				
Group A: Control Structures (Any three)				
Solving assignment no.1 is mandatory				
1	 a) Understanding and Implementing Problem-Solving Tools Task: Choose one of the following problems and solve it using both an algorithm and a flowchart: Problem 1: Write an algorithm to find the maximum number in a list of integers. Represent the algorithm then create a flowchart for it. Problem 2: Write an algorithm to check whether a number is prime or not, then draw a flowchart to illustrate the solution. 			

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	 b) Pseudocode and Task: Write pseudoc Problem 1: 	Program Design ode for the following problems Find the factorial of a number.	S:		
	Problem 2:	Determine whether a number is	s even or odd.		
	Writer C program for	printing following patterns:			
	*	*****	*	*	
	**	****	***	***	
	***	***	****	****	
2	****	**	*****	***	
	****	*	*****	*	
	Right-Angled	Inverted Right-Angled	Pyramid	Diamond	
	Triangle	Triangle	,		
	Write a menu driven	C program for			
	a) Calculate the sur	n of all numbers from 1 to n th	at are divisible by 4.		
3	b) Calculate the sur	n of all prime numbers from 1	ton		
	c) Find out if the m	mber is a Pythagoras triplet.	Ex.: $a^2 + b^2 = c^2$.		
	Write C program to a	accept an object mass in kilog	rams and velocity in me	ters per second and display	
4.	its Momentum. Mom	entum is calculated as e=mc w	where m is the mass of ob	piect and c is its velocity.	
	Write a C program to	accept the length of 3 sides o	f triangles and to test &	print the type of triangle as	
5	equilateral, isosceles	or right angled or none		F	
		Group B: Array & St	ring (Any two)		
	Write menu driven C	program for Array input from	user & do the following		
	a) Find Max and M	n element		·	
1	b) Find Frequency (of given element in array			
1	c) Find Average of	elements in array			
	Find Mean of the arra	av			
	In FE Computer Eng	ineering class group A stude	nt's play cricket group	B students play badminton	
	and group C students	play football.	ne s play energe, group	B students plug suchimiten	
	Write a C program to	compute following: -			
2	a) List of students v	who play both cricket and badn	ninton		
-	b) List of students v	who play either cricket or badm	inton but not both		
	c) Number of stude	nts who play neither cricket no	r badminton		
	d) Number of student	s who play cricket and footbal	l but not badminton.		
	Write a C program to	compute following operations	on String:		
	a) To display word	with the longest length	0		
	b) To determines th	e frequency of occurrence of p	articular character in the	string	
3	c) To check whethe	r given string is palindrome or	not	C	
	d) To display index	of first appearance of the subs	tring		
	e) To count the occur	rences of each word in a given	string		
	Write a C program t	hat store 12 city names in a s	single dimensional array	. Write function to display	
4	only those city name	that begin with a consonant &	t ends with a vowel. For	Eg: Pune	
Group C: Functions & Structure (Any two)					
1	Write C program to c	emonstrate the Parameter-Pas	sing Methods to Function	n	
	Write a C program to	store marks scored in subject	"Problem Solving Techr	niques" by N students in	
	the class. Write funct	ions to compute following:	C		
	a) The average scor	e of class			
2	b) Highest score and	l lowest score of class			
	c) Count of students	who were absent for the test			
	d) Display mark with highest frequency				
			0		
		(≤ Dept. of)⊖ ≻ Comp. Enga.) ⊑	Prof. (Dr.) S. R. Dhore	e	

	Create Structure EMPLOYEE for storing details (Name, Designation, gender, Date of Joining and		
3	Salary), and store the data and update the data in structure.		
	Write a program in C to define a structure for Customer bank account that holds Information like		
	Account Number, Name of account holder, balance, Internet banking facility availed (Yes or No), Pin		
	code (422001 to 422013), Account type (saving, recurring, deposit)		
	a) Read account details for n customers		
4	b) Identify the golden, silver and general customers.		
	c) Display the list of customers availing the Internet banking facility		
	d) Display the customers belonging to a particular geographical location depending on postal code		
	e) Display the customer list as per their account type		
	Use Functions for above cases.		
	Write a program in C using structure for maintaining extra-curricular activities of students (roll, name,		
	year, activity name, and prize). The prize can be either cash prize or memento but not both. Cash prize		
5	is to be recorded as integer and memento is to be recorded as character string. Use union within		
	structure for prize. Read extra-curricular activity record for n students and display extra-curricular		
	activities.		
	Group D: Searching & Sorting (Any two)		
	Write a Menu-Driven C Program for Student Attendance. Program store roll numbers of student in		
1	array who attended training program in random order. Write functions for Various Search Techniques		
	(Sequential, Binary) for whether particular student attended training program or not.		
	Write a C program to store first year percentage of students in array. Write function for sorting array of		
2	floating-point numbers in ascending order using Selection Sort, Bubble sort and display top five		
	scores.		
	Write a Menu-Driven C program to compute following computation on matrix:		
3	a) Addition of two matrices b) Subtraction of two matrices		
5	c) Multiplication of two matrices d) Transpose of a matrix		
	e) Determine location of saddle point		
	Write a Menu-Driven C program to compute or display matrix operations:		
4	a) Printing diagonal element b) Printing Upper triangle & lower triangle		
	c) sum of all even numbers from matrix		
F	Write a C program to store 12th class percentage of students in array. Write function for sorting array		
5	of floating-point numbers in ascending order using Radix sort and display top five scores.		
	Write a C program to store 10th class percentage of students in array. Write function for sorting array		
6	of floating-point numbers in ascending order using bucket sort and display top five scores.		
TIME			
Usefu a) htt	I LINKS/ Kesources:		

b) <u>https://nptel.ac.in/courses/106105171</u>

BCC25315A0X: Design Thinking & Ideation					
Teaching S	eaching Scheme: Credit Examination Scheme:				
Theory: 01 l	ory: 01 Hrs. / week 01 CIE: 50 Marks				
Prerequisite	Courses, if any:	NIL			
Companion	Course, if any: N	IL			
Course Obje Understan Apply kno Develop cr Demonstra Evaluate a Develop a Course Outc CO1: Apply en CO2: Generate CO3: Carry ou	 Companion Course, if any: NIL Course Objectives: Understand the core principles of design thinking and its role in engineering. Apply knowledge of design thinking to analyze and solve complex problems. Develop creative and user-centered solutions to real-world challenges. Demonstrate effective communication and collaboration in multidisciplinary teams. Evaluate and analyze design concepts and prototypes. Develop a mindset for continuous innovation and improvement Course Outcomes: On completion of the course, learner will be able to – CO1: Apply empathy and observation to gain insights into user needs and behaviors. CO2: Generate innovative ideas and solutions through brainstorming and ideation. 				
CO4: Present a	and communicate d	esign ideas effectively.	ess real-world design challer	IGES	
	ate with peers and	Course Conte	nts	1203.	
Unit I	Intro	oduction to Design Thinkin	ng (CO1&CO2)	(02 Hrs)	
Introduction to thinking proces Sustainable De	Design Thinking, ss. Brain Storming, evelopment Goals.	understanding what is design, Decide the topic for Brain-Sto	Who is a design thinker, Wh orming, generate keywords o	at is a design or ideas. 17 UN	
Mapping of C	Mapping of Course Outcomes with POs & PSOs PO: 03, 06				
	it II Case Studies (CO1) (03 Hrs)				
Unit II		Case Studies (CC	01)	(03 Hrs)	
Unit II Case studies to	understand the des	Case Studies (CC	01) visit to validate: Refer Ann	(03 Hrs) exure I and II	
Unit II Case studies to Mapping of C	understand the des ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs	 visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, 	(03 Hrs) exure I and II 11	
Unit II Case studies to Mapping of C Unit III	understand the des ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1	 visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) 	(03 Hrs) exure I and II 11 (03 Hrs)	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se	understand the des ourse Outcomes w idea generation an condary research m	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s nethods.	1) visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mapping	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se Mapping of C	understand the des ourse Outcomes w idea generation an condary research m ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s iethods.	1) visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mappi PO: 01 to 10	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se Mapping of C Unit IV	understand the des ourse Outcomes w idea generation an condary research m ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s hethods. ith POs & PSOs Research Methodology (C	01) visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mapping PO: 01 to 10 CO3&CO5)	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to (03 Hrs)	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se Mapping of C Unit IV Sources of sec Symposiums, I Journals, etc., I talking to expe Application of	ounderstand the des ourse Outcomes w idea generation an condary research m ourse Outcomes w ondary research – information gathere Data Sets, Survey R rts, questionnaires, primary and second	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s nethods. ith POs & PSOs Research Methodology (C 5W/1H tool, Publications, Ev d from the Internet, Web reso cesults, Census Data, Records Cue-cards, surveys, visits, int dary research methodology.	visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mappi PO: 01 to 10 CO3&CO5) vents: Conference Papers, Web and Standards. Sources of p erviews, focus group discuss	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to orkshops, Magazines, Web rimary research- tions etc.	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se Mapping of C Unit IV Sources of sec Symposiums, I Journals, etc., I talking to expe Application of Mapping of C	ounderstand the des ourse Outcomes w idea generation an condary research m ourse Outcomes w ondary research – information gathere Data Sets, Survey R rts, questionnaires, primary and second ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s nethods. ith POs & PSOs Research Methodology (C 5W/1H tool, Publications, Ev d from the Internet, Web reso cesults, Census Data, Records Cue-cards, surveys, visits, int dary research methodology. ith POs & PSOs	 visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mappi PO: 01 to 10 CO3&CO5) vents: Conference Papers, Webard Standards. Sources of perviews, focus group discuss PO: 02, 03, 04, 08, 09, 10 	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to (03 Hrs) orkshops, Magazines, Web rimary research- ions etc.	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se Mapping of C Unit IV Sources of sec Symposiums, I Journals, etc., I talking to expe Application of Mapping of C Unit V	ounderstand the des ourse Outcomes w idea generation an condary research m ourse Outcomes w ondary research – information gathere Data Sets, Survey R rts, questionnaires, primary and second ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s nethods. ith POs & PSOs Research Methodology (C 5W/1H tool, Publications, Ev d from the Internet, Web reso cesults, Census Data, Records Cue-cards, surveys, visits, int dary research methodology. ith POs & PSOs Ideation (CO2&C	 visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mappi PO: 01 to 10 CO3&CO5) vents: Conference Papers, Weband Standards. Sources of perviews, focus group discuss PO: 02, 03, 04, 08, 09, 10 O4) 	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to orkshops, Magazines, Web rimary research- tions etc. (03 Hrs) (03 Hrs)	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se Mapping of C Unit IV Sources of sec Symposiums, I Journals, etc., I talking to expe Application of Mapping of C Unit V Brain storming	ounderstand the des ourse Outcomes w idea generation an condary research m ourse Outcomes w ondary research – information gathere Data Sets, Survey R rts, questionnaires, primary and second ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s nethods. ith POs & PSOs Research Methodology (C 5W/1H tool, Publications, Ev d from the Internet, Web reso cesults, Census Data, Records Cue-cards, surveys, visits, int dary research methodology. ith POs & PSOs Ideation (CO2&C gent thinking, SCAMPER, lat	 visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mappi PO: 01 to 10 CO3&CO5) vents: Conference Papers, Weband Standards. Sources of perviews, focus group discuss PO: 02, 03, 04, 08, 09, 10 O4) eral thinking, idea sketching. 	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to orkshops, Magazines, Web orikshops, S, Magazines, Web orikshops, Magazines, Web orikshops, Magazines, Web orikshops, Magazines, Web original field (03 Hrs)	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se Mapping of C Unit IV Sources of sec Symposiums, I Journals, etc., I talking to expe Application of Mapping of C Unit V Brain storming Mapping of C	ounderstand the des ourse Outcomes w idea generation an condary research m ourse Outcomes w ondary research – information gathere Data Sets, Survey R rts, questionnaires, primary and second ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s nethods. ith POs & PSOs Research Methodology (C 5W/1H tool, Publications, Ev d from the Internet, Web reso cesults, Census Data, Records Cue-cards, surveys, visits, int dary research methodology. ith POs & PSOs Ideation (CO2&C gent thinking, SCAMPER, lat	 visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mappi PO: 01 to 10 CO3&CO5) vents: Conference Papers, Weband Standards. Sources of perviews, focus group discuss PO: 02, 03, 04, 08, 09, 10 O4) eral thinking, idea sketching. PO: 02, 03, 04, 05, 06, 07, 	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to orkshops, Magazines, Web rimary research- tions etc. (03 Hrs) (03 Hrs)	
Unit II Case studies to Mapping of C Unit III Techniques for primary and se Mapping of C Unit IV Sources of sec Symposiums, I Journals, etc., I talking to expe Application of Mapping of C Unit V Brain storming Mapping of C	ounderstand the des ourse Outcomes w idea generation an condary research m ourse Outcomes w ondary research – information gathere Data Sets, Survey R rts, questionnaires, primary and second ourse Outcomes w if for ideation, diverg ourse Outcomes w	Case Studies (CC ign thinking process and field ith POs & PSOs Idea Generation (CO1 d brainstorming, key words, s nethods. ith POs & PSOs Research Methodology (C 5W/1H tool, Publications, Ev d from the Internet, Web reso Results, Census Data, Records Cue-cards, surveys, visits, int dary research methodology. ith POs & PSOs Ideation (CO2&C gent thinking, SCAMPER, lat ith POs & PSOs	 visit to validate: Refer Ann PO: 02, 03, 06, 07, 08, 10, &CO4) orting, linkages. Mind mappi PO: 01 to 10 CO3&CO5) rents: Conference Papers, Weband Standards. Sources of perviews, focus group discuss PO: 02, 03, 04, 08, 09, 10 O4) eral thinking, idea sketching. PO: 02, 03, 04, 05, 06, 07, of. (Dr.) S. R. Dhore and of Computer Department 	(03 Hrs) exure I and II 11 (03 Hrs) ing. Introduction to (03 Hrs) orkshops, Magazines, Web rimary research- tions etc. (03 Hrs)	

Group Structure:

- 1. Working in faculty monitored groups. The students plan, manage and complete a task / project / activity which addresses the stated problem.
- 2. There should be a of team / group of 3 4 students.

Learning Resources

Reference Books:

- 1. Design Thinking: Understanding How Designers Think and Work by Nigel Cross
- 2. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation" by Tim Brown
- 3. Design Thinking for Visual Communication" by Ranjan Nayar and Jaidip Subedi
- 4. The Design of Everyday Things" by Don Norman• "Design Thinking: Creativity and Innovation" by S. Balaram
- 5. Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days" by Jake Knapp
- 6. Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley and David Kelley (with a foreword by Ratan Tata)

MOOC / NPTEL Courses/Other Resources:

- 1. https://swayam-plus.swayam2.ac.in/courses
- 2. https://swayam.gov.in/explorer
- 3. https://nptel.ac.in/courses

Guidelines for CIE (50)

- 1. First evaluation based on presentation to be conducted around midterm for 10 marks.
- 2. Second presentation to be conducted at the time of submission for 10 marks.
- 3. The evaluation of the submitted report for 10 marks.
- 4. The final hard prototype will be evaluated for 20 marks. [Creativity and originality (05), Clarity and completeness (05), Justification of prototype features

(05), Quality (05)]

Annexure I:

- 1. Nike: Renowned as a prominent influencer in the shoe design industry, Nike has maintained its status as a favorite among athletes for nearly five decades.
- 2. Airbnb: Known as the pioneer of the experience economy, Airbnb today stands as a \$75.4B company still dictating the fundamentals of user-friendly design. However, behind Airbnb's massive success lies its approach to human-centric design.
- 3. Netflix: Credited for bringing in the phenomenon of 'binge-watching', Netflix has been known for keeping up with the changing market and producing customer-friendly solutions.
- 4. GE Healthcare: Founded in 1994, GE Healthcare is headquartered in Chicago, Illinois, and operates in more than 100 countries. It was through design thinking that the brand revamped the typically scary experience that children face when undergoing a scan.
- 5. UberEats: UberEats stands out among other delivery services as one of the fastest-growing platforms. Unlike a retrospective approach, which focuses on refining existing models, UberEats opted for a forward-thinking strategy, emphasizing the importance of creativity and user-centric design from the outset.
- 6. Oral B: Oral-B, a renowned brand in oral hygiene products, has consistently leveraged design thinking principles across its product development and innovation endeavours.
- 7. Project Bloks: Project Bloks was an experimental research project initiated by Google's Creative Lab in collaboration with IDEO to explore tangible programming for kids.
- 8. Tata Nano: The People's Car: Explore how Tata Motors aimed to revolutionize the automobile industry by creating an affordable and compact car for the masses, known as the Tata Nano.
- 9. Aravind Eye Care System: Investigate how Aravind Eye Care System in India used innovative design thinking to provide high-quality, affordable eye care services to a large population, often in remote areas.
- 10. Aadhaar: India's Unique Identification Program: Explore how the Aadhaar program used biometric data and design thinking to provide millions of Indians with a unique identification system, enhancing access to government services and benefits.
- 11. Ola Cabs: Transforming Transportation in India: Learn how Ola, an Indian ride-sharing platform, disrupted the traditional taxi industry by applying innovative design thinking to its services and business model.
- 12. Swiggy: Redefining Food Delivery: Investigate how Swiggy, an Indian food delivery platform, leveraged design thinking to enhance the food delivery experience for customers and partner restaurants
- 13. Lifebuoy: Promoting Hygiene in Rural India: Explore how Lifebuoy, a brand under Unilever, used design thinking to develop innovative marketing campaigns and products to promote hand washing and hygiene in rural India.
- 14. Amul: The White Revolution in India: Analyze how the Amul cooperative transformed the dairy industry in India through a unique business model, design thinking, and innovative marketing strategies
- 15. Flipkart: E-commerce Success Story: Study how Flipkart, one of India's leading ecommerce platforms, employed design thinking to grow its business and offer a wide range of products and services.
- 16. Designing Google's Self-Driving Car: Explore how Google used design thinking to develop autonomous vehicles that redefine transportation.
- 17. Dyson: Revolutionizing Vacuum Cleaners and Hand Dryers: Investigate how Dyson's innovative design thinking has transformed household appliances.
- 18. SpaceX: Advancing Space Exploration Through Design Thinking: Analyze SpaceX's approach to space technology and how it has disrupted the aerospace industry.
- 19. Red Bull: Creating an Energy Drink Empire: Learn how Red Bull's unique design thinking approach contributed to the success of their energy drink and brand.
- 20. McDonald's: Evolution of Fast-Food Service: Study the design thinking principles applied by McDonald's to enhance their customer experience and streamline operations.
- 21. Nest: Reinventing Thermostats and Home Automation: Examine how Nest Labs, a subsidiary of Google, reimagined home automation with their smart thermostats and other products.
- 22. LEGO: Building a Design-Centric Toy Empire: Investigate how LEGO has used design thinking to create a global brand that fosters creativity and learning through play.
- 23. Starbucks: Brewing Design Innovation in the Coffee Industry: Analyze how Starbucks incorporates design thinking into its store layouts, product offerings, and customer experiences.
- 24. Amazon: Customer-Centric Design in E-commerce: Discover how Amazon's design thinking philosophy has played a pivotal role in its e-commerce dominance

<u>Annexure II</u>

1. Accops	2. Udchalo	3. Vigyan Ashram 4. SPPU Innovation Centre
5. Vir Bike	6. Copper Cloud	7. Bhau Innovation Centre 8. NCL Innovation Centre

Dept. of

Prof. (Dr.) S. R. Dhore Head of Computer Departm

Army Institute of Technology Dighi Hill's,Pune - 15.

	BCC25316A0X: Design Thinking & Ideation Laboratory						
Teach	Teaching Scheme:CreditExamination Scheme:						
Practi	Practical: 02 hrs. / week 01 Term Work: 25 Marks						
Preree	quisite Courses, if any: Basi	c Mathematical concepts.					
Comp	anion Course, if any:						
Cours	se Outcomes:	ill ha abla ta					
CO1:	Think out of box with the solic	If be able to-	leation.				
CO2:	Present Solutions to problems						
1 D.	Gui	delines for Student's Lab Journa	1				
1. Dr	aw the diagram on blank pages.	You can use colored pencils/sketch pe	ens etc to make your work clear and				
2. Th	e content will be written on one	side ruled pages.					
3. Th	e pictures can be pasted on the b	lank side.					
1 15	Gu	idelines for Lab /TW Assessment	t ubmission / task completion 05				
int	erests shown in the classroom a	ad laboratory and 05 marks for file wr	iting.				
2. 05	marks is for theory attendance.		C .				
3. 05	marks class presentations.						
1. Co	Gui ome with a completed file.	delines for Laboratory Conduction	on				
2. En	sure the file is checked regularly	7.					
3. Pa	rticipate in class/lab activities.						
4. Co	omplete your tasks on time.						
1	I	ist of Laboratory Experiments					
1.	Explain design thinking proces	as in 200 words					
2.	Draw a flow chart of the steps involved in brainstorming and generation of key words to select your project of design thinking. Submit a list of brainstormed ideas along with justification for the selected one.						
3.	Explain the topic selected for the project in 300 words, with the relevant diagrams/flow charts/pictures if any						
4.	Write a report of 200 words on any one of the case studies discussed with the relevant diagrams/flow charts/pictures if any						
5.	Write 300 words report on the site visit with the relevant diagrams/flow charts/pictures if any						
6.	Create a mind map of your idea. It should have at least 3 branches. Color code it for ease of understanding.						
7.	Write 500 words report on Prin	Write 500 words report on Primary research with conclusions, acknowledgements and references.					
8.	Write 300 words report on diagrams / flow charts / picture	Write 300 words report on Secondary research with conclusions drawn, along with the relevant diagrams / flow charts / pictures					
9.	Use Scamper to fine tune the meaningful actionable stateme	e selected idea and redefine the pr nts for creative idea solving.	oblem statement with the help of				
10.	Make rough sketches of the ide	ea and explain them in 200 words.					

ſ 2

BCC25316A0X: Indian Knowledge System					
Teaching Scheme:CreditExamination Scheme:					
Theory: 02 hrs. / week	02	CIE: 50 Marks			
Prerequisite Courses, if any: - NA					
Companion Course, if any: - NA					
Course Objectives:					
 To understand the nature of knowledge To understand the evolution of the set 	ge. iontific annroach in the India	n subcontinent			
 To understand the evolution of the sc To study contributions made by diff 	erent people to the various	branches of knowledge before modernit			
evolved in India.	erent people to the various	branches of knowledge before modernit			
Course Outcomes: On completion of	the course, learner will be	e able to -			
CO1: The concept of the ancient intellect	ual knowledge tradition will ient times will be introduced	be understood.			
CO3: Developments in humanities from	ancient times will be underst	tood.			
	Course Contents				
Unit I Introdue	ction to Indian Knowled	ge System (06 Hrs.			
Definition, Scope and importance of know	owledge, nature of Indian K	nowledge System, Evolution of scientifi			
approach					
Mapping of Course Outcomes with PO	s & PSOs PO	3, PO9, PSO1			
Unit II	Development of Science	s (12Hrs)			
Astronomy- Aryabhatta, Varahamihira, S	awai Jaisingh, b. Mec	licine- Ayurveda and Yunani, Metallurgy			
Copper, Iron, Bronze & alloys					
Mapping of Course Outcomes with PO	s & PSUs PU				
Unit III Role of Ancient India	an Engineering Principle	s in Modern Practices (12 Hrs)			
India – Takshashila, Nalanda, Valabhi U	niversity, Architecture	iddinist, Jama, Education system in ancier			
Mapping of Course Outcomes with PO	s & PSOs PO	3			
	Learning Resources				
Text Books:					
1. Abdur Rahman, Science and Technology in Medieval India: A Bibliography of Source Materials in Sanskrit,					
Arabic, and Persian, Indian Nation	al Science Academy, New De	lhi, 1982.			
 Bag A. K. (ed), History of Techno Science Academy, Delhi, 1997. 	blogy in India (Vol I) (From	Antiquity to C. 1200 A.D.), Indian Nationa			
3. Chattopadhyaya, Debiprasad, History of science and technology in ancient India: the beginnings, Firma KLM Pyt Ltd 1986					
4. Dasgupta Surendranath, A History of Indian Philosophy, Cambridge University press, 1922.					
5. Gopal L. and V. C. Shrivastava, History of Agriculture in India (Upto 1200 A. D.), Concept Publishing, New Delhi, 2008.					
6. Irfan Habib (ed.), People's History of India – Vol 20: Technology in Medieval India, c. 650–1750, Aligarh Historians Society and Tulika Books, 2016.					
Reference Books:					
1. Jan Gonda, A History of Indian Li	erature, Otto Harrassowitz, W	/iesbaden, 1975.			
2. Padmanabha Thanu (ed.), Astrono Springer New Delbi 2014	my in India: A Historical Per	spective, Indian National Science Academy			
3. Sohoni Pushkar, Introduction to the	e History of Architecture in Ir	dia, IISER, Pune, 2020.			
4. Tripathi Radhavallabh, Vāda in th	. Tripathi Radhavallabh, Vāda in theory and practice: studies in debates, dialogues and discussions in Indian				
intellectual discourses, IIAS, Shim	intellectual discourses, IIAS, Shimla, 2016.				
$\left(\left \sum_{i=1}^{i} \left(\operatorname{Comp. Engg}_{i} \right) \right \right)$ Prof. (Dr.) S. R. Dhore					

PUNE

Examination Pattern I. K. S. Theory			
Paper: Total 2 CreditsTotal 50 Marks			
Marks Scheme of Examination:			
A. Semester End Exam 35 Marks (Minimum Marks 14 for passing)			
B. Internal Assessment 15 Marks (Minimum Marks 06 for passing)			
A. Details of Question Paper Pattern for offline Examination - Time (2 Hr.), (35 Marks)			
Q.1) Answer the following questions in 200 words (any 1 out of 2) 10 Marks			
Q.2) Answer the following questions 200 words (any 1 out of 2) 10 Marks			
Q.3) Answer the following questions in 200 words (any 1 out of 2) 10 Marks			
Q.4) Write short notes (any 1 out of 2) 5 Marks			
B. Internal Assessment (15 Marks)			
a) 10 Marks: Mid Semester Exam.			
b) 5 Marks: Home Assignment, Oral, Students Seminar, PPT presentation. (any One)			

BCC25317.	A0X: Commu	nication Skills &	z Human Values	
Teaching Scheme:	C	redit	Examination Scheme:	
Theory: 01 hr / week		01	CIE: 50 Marks	
Prerequisite Courses, if any	: NA			
Companion Course, if any:	NA			
 Course Outcomes: On completion of the course, learner will be able to - CO1: To make the engineering students understand, analyze and interpret the essentiality of grammar, vocabulary and phonetics and their proper usage facilitated by professors and a Language Laboratory. CO2: To encourage self-awareness by exploring beliefs, values, strengths, weaknesses, and aspirations to facilitate students to construct a career development plan (roadmap) that outlines the skills required for the type of job, recognizing individual skill strengths and gaps, and identify activities that can be used to acquire the skills associated with the gaps. CO3: To teach professional skills like communication skills, presentation skills, technical writing skills, paper reading, networking skills through instruction, knowledge acquisition, and demonstration. CO4: To train future engineers to prepare for interviews and adapt to a diverse socio-economic arena while functioning effectively in multi-disciplinary and heterogeneous teams through the knowledge of teamwork, interpersonal relationships, conflict management and leadership quality. CO5: To understand the significance of universal human values in promoting harmony, compassion, and 				
harmony.	Com	an Contonta		
Unit I		rse Contents		(3 U rs)
Articles, Tenses, Prepositions, related to the field of technolog vocabulary.	Adverbs, Adjective gy and phrases, idi	es, Pronunciation Gu ioms, proverbs, signif	ide, and Exposure to techn ficant abbreviations, formal	ical terms (business)
Mapping of Course Outcomes wit	th POs & PSOs	PO1, PO2, PO3, PO4,	PO5, PO9, PO10, PSO1	
Unit II	Pe	ersonal Skills		(3 Hrs)
Introduction to Soft-Skills, S Adaptability, Assertiveness, Self	Self-Awareness, S Self-Assessment, Moti	tress Management, vational Skills, Organ	Taking Criticism, Self C ization, Planning	onfidence,
Mapping of Course Outcomes wit	th POs & PSOs	PO1, PO2, PO3, PO5,	PSO1	
Unit III	Comm	nunication Skills		(3 Hrs)
Concept, Methods and Models of Listening Ethics, Creative Wri Public Speaking.	f Communication, ting, Storytelling,	Verbal Communication Visual Communication	on, Body Language, Listenin ion, Listening Skills, Readi	g Barriers, ng Skills,
Mapping of Course Outcomes wit	th POs & PSOs	PO1, PO2, PO3, PO4,	PO5, PO6, PSO1	
Unit IV	Pro	fessional Skills		(3 Hrs)
Interview Skills, Email Writing, Note Writing, Summarization, CV Writing, Cover-Letter, Minute Writing, Report Writing, Writing effective Proposals, Meeting Management, Entrepreneurial Thinking, Decision Making, Problem Solving, Crisis Management, Negotiation Skills, Team Building Strategies				
Mapping of Course Outcomes wit	th POs & PSOs	PO1, PO2, PO3, PO4,	PO5, PO6, PSO1	
Unit V	H	uman Values		(3 Hrs)
Work Ethics, Universal Human Values, Time Management, Goal Setting, Value based action plan, Community Service, Ethics in Innovation, How to avoid Plagiarism				
Mapping of Course Outcomes with	th POs & PSOs	PO1, PO2, PO3, PO4,	P05, P06, P09, PS01	
		Prof. (Dr.)	S. R. Dhore	
Computer Engineering, AIT F	Pune Pune	Army Institu Dighi Hill's,	te of Technology Page Pune - 15.	e 31 of 63

BCC25317A0X: Communication Skills & Human Values Tutorial				
Teaching	eaching Scheme: Credit Examination Scheme:			
Tutorial:	01 hrs. / week	01	Term Work: 25 Marks	
Prerequis	ite Courses, if any	: Basic English		
Guidelines for Instructor's Manual The instructor 's manual is to be developed as a hands-on resource and reference. The instructor's manual needs to include prologue (about Program/ Institute/ department/foreword/ preface etc.), Course Syllabus, POs, PSOs, Cos, CO-PO-PSO mapping, Assignment mapping with CO, PO and Blooms taxonomy mapping, conduction & Assessment guidelines, topics under consideration concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.				
The studen assessment performanc parameters	t must prepare a fit of laboratory work the of student. Each with appropriate we	le that will include all the assignment a is to be done based on overall perf Laboratory assignment assessment wi ghtage.	s performed in the class. Continuous formance and laboratory assignment's Il be assigned grade/marks based on	
Each labor enthusiasm considered	ratory assignment a , participation and while granting term	Guidelines for Lab /TW Assessm ssessment includes timely completion contribution in various activities. Att work.	nent , performance, punctuality, neatness, endance of the student will also be	
The instruc assignments participate skills, perso	tor may frame assign s can be prepared a actively in each act onal skills, profession	Guidelines for Laboratory Condu- imments to enhance skills supporting caree and distributed among batches. Every ivity. The assignments must aim to enh al skills and human values.	ction r aspects. Multiple set of activity-based student must be given opportunity to hance language skills, communications	
		List of Laboratory Experimen	ts	
	1	Group A- Language Skills		
1.	Grammar Test			
2.	Vocabulary Test			
3.	Comprehension			
		Group B- Personal Skills		
1.	Flag			
2.	SWOC			
3.	Self-Awareness Qu	iestionnaire		
4.	Johari Window			
5.	Time Management	Activity		
		Group C- Communication Ski	lls	
1.	Extempore			
2.	Inner Monologue			
3.	Role Play			
4.	GD			
5.	Creative Writing			
6.	Article Reading	ENTE OF THE	28	
		Dept of Comp. Engg. C	S. R. Dhore	

PUNE

	Group D- Professional Skills
1.	Mock Interview
2.	CV
3.	Cover Letter
4.	Report Writing
5.	Paper Summarising
6.	Problem Solving
	Group E- Human Values
1.	Time Management
2.	Presentation
3.	GD
4.	Personal & Career Goal setting – Short term & Long term
5.	Paper Writing
Useful Lin 1. "Idic Perso 2. An A 3. Com 4. Crea 5. Soft 6. Perso 7. The' 8. Priya 9. M.S. 10. Asw 11. Bahl 12. Bala 13. Bang Corr 14. Bove 15. Eyre 16. Ghan 17. Ludl 18. Mon 19. Ram 20. Ruth 21. Kish 22. Murj 23. Dutt 24. Peter	 Jaky Resources: Jams and proverbs are fun", Wilco books(author) Soft Skills – An Integrated Approach to Maximize onality by Gajendra Singh Chauha and Sangeeta Sharma Japproach to Communication Skills by Indrajit Bhattacharya munication Skill, Oxford University Press by Sanjay Kumar and Pushpa Lata tive English for Communication by Krishnaswami N. and Sriraman T skills Training – A workbook to develop skills for employment by Fredrick H. Wentz Jonality Development and Soft skills, OxfordUniversity Press by Barun K. Mitra Time Trap: The Classic book on Time Management by R. Alec Mackenzie Jadrashani Patnaik, "Group Discussion and Interview Skills", Foundation Books Rao, "Strategies for improving your business communication", SPD althapa, K (1991) OrganisationalBehaviour, Himalayan Publication, Mumbai. J.C. and Nagamia,S.M. (1974) Modern Business Correspondence and Minute Writing. n,K.R. and Rayudu C.S. (1996) Effective Communication, Beacon, New Delhi. th, L Sue, Fryar,Maridell and Thomas David A. (1998) How to Write First Class Business espondence, N.T.C. Publishing Group USA. eeCourtland,L and Thrill, John V(1989) Business Communication Today the C. (1985) Effective Communication Made Simple, Rupa and Co.Calcutta. nekar,A(1996) Communication Skills for Effective Management, Everest Publishing House, Pune. ow, Ron. (1995) The Essence of Effective Communication, Prentice, New Delhi. ippalli, M.M. (1997), The Craft of Business Letter Writing, T.M.H. New Delhi. an, Meenakshi and Sharma, Sangeeta (2004) Technical Communication: Principles and Practice. erford A. J., "Communication Skills for Technical Communication", Pearson Education ha Mohan, "Developing Communication Skills", Foundation Books toach, "English Phonetics and Phonology", 4th Edition, Cambridge
	Dept. of Comp. Engg

A * PUNE

Head of Computer Departme Army Institute of Technology Dighi Hill's,Pune - 15.

BCC25318A0X: Environmental Science					
Teaching Scl	Teaching Scheme: TH:01CreditExamination Scheme:				
Online Learnin Guest lectures, Activities etc	g, Presentations, MOOC courses, Hands-on Assignments, Team	(Mandatory Non-Credit Course)	Audit Course		
Prerequisite	Courses, if any: Environmenta	l Science basic knowledge	e learnt till 12th Standard		
Companion	Course, if any: NA				
Audit course fo	or Environmental Science is mandat	ory but non-credit course. As	sessment has to be conducted at		
for grade point	& CGPA.	level. Grade awarded for aud	it course shall not be calculated		
 Course Objectives: To explain the concepts related to sustainable development and various components of environment. To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control. To gain an understanding of the value of biodiversity and current efforts to conserve biodiversity at national and local level. To examine a range of environmental issues in the field, and relate these to scientific theory and find their solutions using technology. Course Outcomes: On completion of the course, learner will be able to - CO1: Demonstrate an integrative approach to environmental issues with a focus on sustainability. CO2: To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control. CO3: Identify key threats to biodiversity and develop technological options for conserving biodiversity in different settings. 					
CO4: Learn s.	kills required to research and ana	lyze environmental issues so	cientifically and these skills in		
applied	Courses that may n	rse Contents			
	Introduction to	Environmental Science	$(2 \text{ II}_{\text{reg}})$		
UIIIt I Multidiaginling	Introduction to	Environmental Science	(2 Hrs)		
Multidisciplina technology to sustainable dev	Introduction to ary nature of subject environmental protect and improve the environm velopment and ethical environmental	Environmental Science Il science; study of natural nent. Scope and importance; I practices. UN sustainable de	(2 Hrs) systems and the application of Concept of sustainability and evelopment goals.		
Multidisciplina technology to sustainable dev Mapping of C	Introduction to ary nature of subject environmental protect and improve the environm relopment and ethical environmental ourse Outcomes with POs & PSO	Environmental ScienceIl science; study of naturalnent. Scope and importance;I practices. UN sustainable desPO1, PO4, PO6, PO7	(2 Hrs) systems and the application of Concept of sustainability and evelopment goals.		
Multidisciplina technology to sustainable dev Mapping of C Unit II	Introduction to ary nature of subject environmenta protect and improve the environm relopment and ethical environmental ourse Outcomes with POs & PSO Environmenta	Environmental ScienceIl science; study of naturalnent. Scope and importance;I practices. UN sustainable desPO1, PO4, PO6, PO7I Pollution and Control	(2 Hrs) systems and the application of Concept of sustainability and evelopment goals. (4 Hrs)		
Multidisciplina technology to sustainable dev Mapping of C Unit II Environmenta nuclear hazard waste, technolo Mapping of C	Introduction to ary nature of subject environmental protect and improve the environmental ourse Outcomes with POs & PSO Environmenta al pollution: types, causes, effects is and human health risks, solid wa ogy in controlling pollution. ourse Outcomes with POs & PSO	Environmental Science al science; study of natural nent. Scope and importance; practices. UN sustainable de s PO1, PO4, PO6, PO7 I Pollution and Control and controls; Air, water, soit aste management. Control me s PO1, PO4, PO6, PO7	(2 Hrs) systems and the application of Concept of sustainability and evelopment goals. (4 Hrs) I, chemical and noise pollution, easures for urban and industrial		
Multidisciplina technology to sustainable dev Mapping of C Unit II Environmenta nuclear hazard waste, technolo Mapping of C Unit III	Introduction to ary nature of subject environmental protect and improve the environmental ourse Outcomes with POs & PSO Environmenta al pollution: types, causes, effects is and human health risks, solid wa ogy in controlling pollution. ourse Outcomes with POs & PSO Biodiver	Environmental ScienceIl science; study of naturalnent. Scope and importance;I practices. UN sustainable desPO1, PO4, PO6, PO7I Pollution and Controland controls; Air, water, soitaste management. Control mesPO1, PO4, PO6, PO7ste management. Control mesPO1, PO4, PO6, PO7	(2 Hrs) systems and the application of Concept of sustainability and evelopment goals. (4 Hrs) I, chemical and noise pollution, easures for urban and industrial (4 Hrs)		
Multidisciplina technology to sustainable dev Mapping of C Unit II Environmenta nuclear hazard waste, technolo Mapping of C Unit III Levels of bio Biodiversity p endemic speci biological inva biodiversity. Mapping of C	Introduction to ary nature of subject environmental protect and improve the environmental ourse Outcomes with POs & PSO Environmenta al pollution: types, causes, effects as and human health risks, solid wa ogy in controlling pollution. ourse Outcomes with POs & PSO Biodiver logical diversity: genetic, species atterns and global biodiversity hot es of India. Threats to biodiversity usions; emerging solutions for cons	Environmental Science al science; study of natural nent. Scope and importance; practices. UN sustainable de s PO1, PO4, PO6, PO7 I Pollution and Control and controls; Air, water, soit aste management. Control me s PO1, PO4, PO6, PO7 stity and Conservation and ecosystem diversity; spots. India as a mega-biodi v: habitat loss, poaching of vervation of biodiversity; In-se s PO1, PO4, PO6, PO7	(2 Hrs) systems and the application of Concept of sustainability and evelopment goals. (4 Hrs) I, chemical and noise pollution, easures for urban and industrial (4 Hrs) Biogeography zones of India; versity nation; Endangered and wildlife, man-wildlife conflicts, situ and Ex-situ conservation of		
Multidisciplina technology to sustainable dev Mapping of C Unit II Environmenta nuclear hazard waste, technolo Mapping of C Unit III Levels of bio Biodiversity p endemic speci biological inva biodiversity. Mapping of C Unit IV	Introduction to ary nature of subject environmental protect and improve the environmental ourse Outcomes with POs & PSO Environmenta al pollution: types, causes, effects is and human health risks, solid wa ogy in controlling pollution. ourse Outcomes with POs & PSO Biodiver logical diversity: genetic, species atterns and global biodiversity hot es of India. Threats to biodiversity asions; emerging solutions for cons	Environmental Science al science; study of natural nent. Scope and importance; practices. UN sustainable de s PO1, PO4, PO6, PO7 I Pollution and Control and controls; Air, water, soi aste management. Control me s PO1, PO4, PO6, PO7 ste management. Control me s PO1, PO4, PO6, PO7 sity and Conservation and ecosystem diversity; spots. India as a mega-biodi v: habitat loss, poaching of vervation of biodiversity; In-s s PO1, PO4, PO6, PO7	(2 Hrs) systems and the application of Concept of sustainability and evelopment goals. (4 Hrs) I, chemical and noise pollution, easures for urban and industrial (4 Hrs) Biogeography zones of India; versity nation; Endangered and wildlife, man-wildlife conflicts, situ and Ex-situ conservation of for the server of the s		
Multidisciplina technology to sustainable dev Mapping of C Unit II Environmenta nuclear hazard waste, technolo Mapping of C Unit III Levels of bio Biodiversity p endemic speci biological inva biodiversity. Mapping of C Unit IV • Visit to an • Visit to a f • Study of co • Site visit f Mapping of C	Introduction to rry nature of subject environmental protect and improve the environmental ourse Outcomes with POs & PSO Environmental al pollution: types, causes, effects is and human health risks, solid was begy in controlling pollution. ourse Outcomes with POs & PSO Biodiver logical diversity: genetic, species atterns and global biodiversity hot es of India. Threats to biodiversity asions; emerging solutions for cons ourse Outcomes with POs & PSO area to document environmental ass ocal polluted site – urban / rural / incommon plants, insects, birds and bas or emerging solution for environmental ourse Outcomes with POs & PSO area to document environmental ass ocal polluted site – urban / rural / incommon plants, insects, birds and bas or emerging solution for environmental ass of urse Outcomes with POs & PSO area to document environmental ass or emerging solution for environmental ass or emerging solution f	Environmental Science al science; study of natural nent. Scope and importance; practices. UN sustainable de s PO1, PO4, PO6, PO7 I Pollution and Control and controls; Air, water, soil aste management. Control material s PO1, PO4, PO6, PO7 sity and Conservation and ecosystem diversity; spots. India as a mega-biodi ': habitat loss, poaching of vervation of biodiversity; In-set s PO1, PO4, PO6, PO7 Field Work sets; river / forest / flora / faur dustrial /agricultural. sic principles of identification ntal issues. sets; river / forest / flora / faur dustrial /agricultural. sic principles of identification ntal issues. prof. (Dr.) S. R. D Head of Computer Army Institute of Te	(2 Hrs) systems and the application of Concept of sustainability and evelopment goals. (4 Hrs) (4 Hrs) I, chemical and noise pollution, easures for urban and industrial (4 Hrs) Biogeography zones of India; versity nation; Endangered and wildlife, man-wildlife conflicts, situ and Ex-situ conservation of (6 Hrs) na, etc. Ohore Department conservation for the propertment conservation of conservation Page 34 of 63		

<u> HOME</u>

Learning Resources

Text Books:

- 1. Air Pollution: H. V. N. Rao and M. N. Rao, TMH Publications
- 2. Environmental Engineering: Peavy and Rowe, McGraw Hill Publications
- 3. Biodiversity Conservation: Present Scenario and Future Prospects, Dr. Amar Nath Singh and Dr. Awadh Kishore Roy, Walnut publication.
- 4. Environment Pollution Control and Environmental Engg. C. S. Rao, Tata McGraw Hill, New Delhi.

Reference Books:

- 1. Principals of Conservation Biology, Groom, Martha J. Gary K. Meffe, and Carl Ronald carroll.. Sunderland: Sinauer Associates.
- 2. 1999. Global Ethics and Environment, Gleeson, B. and Low, N. (eds.) London, Routledge.
- 3. Something New Under the Sun: An Environmental History of the Twentieth Century, McNeil, John R.
- 4. Environmental Science; S. C. Santra; New Central Book Agency (P) Ltd.; 2nd Edtn.

MOOC / NPTEL Courses/Other Resources:

- 1. https://swayam-plus.swayam2.ac.in/courses
- 2. https://swayam.gov.in/explorer
- 3. <u>https://nptel.ac.in/courses</u>

Prof. (Dr.) S. R. Dhore Head of Computer Department. Army Institute of Technology Dighi Hill's,Pune - 15.

ARMY INSTITUTE OF TECHNOLOGY, PUNE

An Autonomous Institute Affiliated to

Savitribai Phule Pune University, Maharashtra, India

B. Tech Computer Engineering Department

Semester - II

National Education Policy (NEP)-2020 Compliant Curriculum First Year Engineering (2025 Pattern) (With effect from Academic Year 2025-26)

www.aitpune.com

BCE25321A0A: Engineering Mathematics II (Linear Algebra and Statistics)						
Teaching Scl	neme:	Cree	lit	Exam	ination Schem	e:
Theory: 03 h	rs. / week	03	5	CIE:	50 Marks	
Duono quigito	Courses if once El	Motho	matica & Flom	ESE:	50 Marks	
Companying		mentary Matne	matics & Elem	entary	Calculus	
Companion	Course, if any: -					
Course Obje	cuves:	or transformations	and their applies	tions ir	computer soid	n co
 To underst To apply r 	robability distribution	s and analyse real-	, and then applied world data using s	atons n.	al methods	chee.
 To apply p To explore 	ioint probability distr	ibutions and Marko	by chains for mod	lelling s	tochastic process	ses.
 To develop 	skills in hypothesis to	esting and evaluating	ng statistical signi	ficance		
• To apply n	nodular arithmetic and	congruences in sol	lving computation	nal prob	lems.	
Course Outc	omes: On completion	n of the course, le	earner will be ab	ole to -		
CO1: Underst	and and apply the co	ncepts of vector spa	aces and linear tra	ansform	ations.	
CO2: Analyze	and utilize probabilit	y distributions for o	data modeling.	~ .		
CO3: Constru	ict and interpret joint	probability distribution	utions and Marko	v Chair	18	
CO4: Apply 8 CO5: Solve p	oblems involving mod	ular arithmetic and	l number theory a	pplicati	ons	
		Course	Contents	ppneut		
Unit I	Vec	tor Space & Lin	ear Transform	ation		(08 Hrs)
Vector spaces: Definition and examples, subspace, linear span, linearly independent and dependent sets, Basis and dimension. Problems. Linear transformations: Definition and examples, algebra of transformations, matrix of a linear transformation. Change of coordinates, rank and nullity of a linear operator, rank-nullity theorem. Inner product spaces and orthogonality problems						
Mapping of C	ourse Outcomes with	POs & PSOs	PO1, PO2, PO3	8, PO4, 1	PO5, PSO1, PSO	02, PSO3
Unit II		Probability I	Distributions			(8 Hrs)
Probability continuous), Binomial, Po for Binomial	Distributions: Rev probability mass an isson and normal di and Poisson distribu	iew of basic pro d density functio stributions- prob tions only)-Illustr	obability theory ns. Mathematic lems (derivation rative examples.	y. Rance al expension s for a Expon	lom variables ectation, mean mean and stand ential distribut	(discrete and and variance. lard deviation ion.
Mapping of C	ourse Outcomes with	POs & PSOs	PO1, PO2, PO3	8, PO4, 1	PO5, PSO1, PSO	02, PSO3
Unit III		Probabilit	y Distribution			(9 Hrs)
Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance and correlation. Markov Chain: Introduction to Stochastic Process, Probability Vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Higher transition probabilities, Stationary distribution of Regular Markov chains and absorbing states.						
Mapping of C	ourse Outcomes with	POs & PSOs	PO1, PO2, PO3	8, PO4, 1	PO5, PSO1, PSO	02, PSO3
Unit IV		Hypoth	nesis testing			(7 Hrs)
Hypothesis testing: Introduction, sampling distribution, standard error, testing of hypothesis, Sampling variables, central limit theorem and confidences limit for unknown mean. Test of Significance for means of two small samples, students' distribution, Chi-square distribution as a test of goodness of fit. F-Distribution.						
Mapping of C	ourse Outcomes with	POs & PSOs	PO1, PO2, PO3	3, PO4, 1	PO5, PSO1, PSC	02, PSO3
Computer En	gineering, AIT Pune	AN PUNE-19	Army Institu Dighi Hill's,f	mputer ite of Te Pune - 1	Department chnology 15.	Page 37 of 63

τ	Unit VModular Arithmetic(8 Hrs)			
Introdu Introdu Diopha theorem	Introduction of modular arithmetic and its applications in Computer Science and Engineering. Introduction to Congruences, Linear Congruences, The Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences-RSA algorithm.			
Mapp	ing of Course	Outcomes with POs & PSOs	PO1, PO2, PO3, PO4, PO5, PSO1, PSO	2, PSO3
		Learning I	Resources	
Text 1. 2. 3. 4. 5.	Books: David C. La Erwin Krey Sharon L. I Scientists", Kenneth H. Sheldon M.	y, Steven R. Lay, and Judi J. McDorzig, "Advanced Engineering Mathen M., Ronald W., Raymond M., Key Pearson. R., "Discrete Mathematics and Its Ap R., "Introduction to Probability Mod	nald, "Linear Algebra and Its Application natics", Wiley ing Y., "Probability and Statistics for pplications", McGraw-Hill. lels", Academic Press.	s", Pearson. Engineers and
Refer 1. 2. 3. 4. 5.	ence Books: Sheldon Ax Gilbert Strat Seymour Li Geoffrey R. Press Ralph P. Gr	ler, "Linear Algebra Done Right", Pu ng, "Introduction to Linear Algebra", pschutz and Marc Lipson, "Schaum's Grimmett and David R.Stirzaker,"Pi imaldi, "Discrete and Combinatorial	ablisher: Springer. , Publisher: Wellesley-Cambridge Press. 5 Outline of Linear Algebra", McGraw-H robability and Random Processes", Oxfor Mathematics" Pearson.	ill. rd University
MOO 1. 2. 3. 4.	C / NPTEL https://youtu https://youtu https://youtu https://youtu	Courses/Other Resources: 1.be/FL9ANdNTQus?si=F6pUpUSsi 1.be/9MCjyQSRmR8?si=y9f0_F8piV 1.be/kfsmzAsAU?si=gB-rogmk0Uc 1.be/6J5bfeNiQ14?si=_maBHNcvoq	90Lpccd V6Q5sJB c4xIg- zO628M	

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	BCE25321A00	C: Engineering Ma	athematics II Tutorial	
Teachi	ing Scheme:	Credit	Examination Scheme:	
Practio	cal: 01 hr. / week	01	Term Work: 25 Marks	
Prereg	uisite Courses, if any: 1. E	lementary Mathemat	tics 2. Elementary Statistics	
Compa	anion Course, if any: Linea	r Algebra and Statist	tics	
Course	e Outcomes:			
On com	pletion of the course, learner w	rill be able to–		
COI:	Understand and apply the con	ncepts of vector spaces a distributions for data r	and linear transformations.	
CO_2 .	Construct and interpret joint	probability distributions	and Markov Chains	
CO4:	Apply statistical inference thro	bugh hypothesis testing		
CO5:	Solve problems involving mod	lular arithmetic and num	ber theory applications	
	Gi	uidelines for Student	's Tutorials	
1.	Every Tutorial is to be written	and completed using give	ven template by faculty.	
	Gu	idelines for Lab /TW	Assessment	
	For TW assessment - weig	htage given to		
1.	Attendance			
2.	Le time Submission			
5.		Guidelines for Cor	duction	
1	Minimum 10 assignments to h	e completed		
		List of Laboratory	Futorials	
	Unit I - V	Vector Space & Linea	ar Transformation	
1	Study of vector spaces, trans	formations and inner pr	oduct spaces using problems	
	Study of Vector spaces, trails	nit II - Probability D	istributions	
1	Study of verious probability	distributions with the he	lp of Microsoft Excel/Suitable a	oftware tools
1.	Study of various probability		ip of wherosoft Excel/ Suitable s	
- 1		nit III- Probability d		
1	Study of joint probability, sto	chastic processes and N	larkov chains using examples.	
		Unit IV- Hypothesi	s testing	
1	Study of hypothesis testing,	sampling distributions	a, and significance tests with su	itable problems
	using Chi-square, t-uistribut	Unit V- Modular A	rithmetic	
1	Study of modular arithmetic	congruences and their	applications in computer science	
Tovt I	Booke	congruences, and then a	applications in computer science.	
1	David C Lay Steven R Lay	and Iudi I. McDonald	"Linear Algebra and Its Applicati	ons" Pearson
2.	Erwin Krey zig, "Advanced E	ngineering Mathematics	S". Wiley	, 1 cu son.
3.	Sharon L. M., Ronald W., F	Raymond M., Keying Y	., "Probability and Statistics for	r Engineers and
	Scientists", Pearson.			C
4.	Kenneth H. R., "Discrete Mat	hematics and Its Applica	ations", McGraw-Hill.	
5.	Sheldon M. R., "Introduction	to Probability Models",	Academic Press.	
Refer	ence Books:			
1.	Sheldon Axler, "Linear Algeb	ra Done Right", Publish	er: Springer.	
2. 3	Saymour Linschutz and Marc	Linear Algeora, Pub	insher: wellesley-Cambridge Pre-	SS.
3. 4	Geoffrey R Grimmett and Da	vid R Stirzaker "Probal	bility and Random Processes" O	-11111. xford University
	Press	ivid IX. StilZaker, 1100a	sinty and Random Processes, o	kiola Oliveisity
5.	Ralph P. Grimaldi, "Discrete a	and Combinatorial Math	ematics" Pearson.	
Usefu	l Links/Resources:			
1.	https://youtu.be/FL9ANdNTQ	us?si=F6pUpUSsi90Lp	ccd	
2.	https://youtu.be/9MCjyQSRm	R8?si=y9f0_F8piW6Q5	5sJB	
3.	https://youtu.be/kfsmzAsAU	J?si=gB-rogmk0Uc4xIg		
4.	https://youtu.be/6J5bfeNiQ14	?si=_maBHNcvoqzO62	8M	
		Comp. Engg.	rof. (Dr.) S. R. Dnore ead of Computer Department	
Compu	ter Engineering, AIT Pune	A PUNE-15	rmy Institute of Technology ighi Hill's,Pune - 15.	Page 39 of 63

BCC25322A0A: Applied Science for Computer Engineering-II				
Teaching Scheme:	Credit	Exam	ination Scheme:	:
Theory: 03 hrs. / week	03	CIE: ESE:	50 Marks 50 Marks	
Prerequisite Courses, if any: -				
Companion Course, if any: -				
 Course Objectives: Gain an in-depth understanding of the fundamental principles of lasers and explore their applications in fibre optic communication systems. Develop a comprehensive understanding of the electrical properties of semiconductors, with an emphasis on the Fermi level, and explore the fundamentals of superconductivity and its real-world applications. Understand and apply the basic principles of Quantum mechanics, wave functions, and equations to solve problems related to electronic devices and materials. Explore the core concepts of quantum computing, including quantum bits (qubits) and their potential applications in solving complex computational problems. Understand the basics of nanotechnology, focusing on nanoparticles and their engineering applications in fields like electronics medicine and metarial sciences. 				
 Course Outcomes: On completion of the course, learner will be able to - CO1: Analyze the working principle of lasers and evaluate their application in fibre optic communication. CO2: Explain the electrical properties and functioning of semiconducting devices based on the Fermi level, and illustrate the fundamentals of superconductivity and its applications. CO3: Apply the basic concepts of Quantum mechanics and solve problems using wave equations in relation to electronic devices. CO4: Define the basics of quantum computing and assess its potential applications in real-world problems. CO5: Describe the fundamentals of nanoparticles and analyze their engineering applications. 				
	Course C	ontents		1
Unit I	Lasers and Fi	ber Optics		(08 Hrs)
 Lasers: Basics of laser and its mechanism, characteristics of the laser, Semiconductor laser, CO₂ laser, Applications of lasers: Holography, IT, industrial, medical. Fibre Optics: Introduction, Acceptance Angle, Acceptance Cone, Numerical Aperture, Types of optical fibres-step index and graded index, Attenuation and reasons for losses in optic fibres (qualitative), Communication system: Block diagram, Advantages of optical fibre communication over conventional methods. 				
Mapping of Course Outcomes wi	th POs & PSOs	PO1, PO2		
Unit II	Electrical Properti	es of Materials		(8 Hrs)
Hall effect and its applications, Fermi level and Fermi energy for metal and semiconductors, FD distribution function, the position of Fermi level in intrinsic semiconductors (derivation); Fermi level for extrinsic semiconductors (qualitative) and its dependence on temperature and doping, working of PN junction diode based on Fermi energy; Solar cell: principle, working, IV-characteristics, efficiency and fill factor, measures to improve efficiency of solar cell, advantages and applications in environmental sustainability. Superconductivity: Introduction to superconductivity; Properties of superconductors (zero electrical resistance, critical magnetic field, persistent current, Meissner effect), numerical problems, Type I and Type II superconductors. Mapping of Course Outcomes with POs & PSOs				
of superconductors.				D, Applications

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Unit III	Quantum Mechanics	(8 Hrs)	
De Broglie hypothesis of matter waves, Heisenberg's Uncertainty Principle and its application, properties of matter waves; Wave function and probability density, mathematical conditions for wave function, Schrödinger's time-independent and time-dependent equations; Significance of Schrödinger's equations, Wave function and Energy of a particle enclosed in a rigid box; Quantum mechanical tunneling, tunnel diode, principle and applications of Scanning tunneling microscope.			
Mapping of Course	e Outcomes with POs & PSOs PO1, PO2		
Unit IV	Quantum Computing	(8 Hrs)	
Moore's law and Entanglement, Qua comparison of class applications of quan	its end, Key Principles of quantum computing, Quantum Super ntum Interference, Quantum Computer Hardware, concept of qubit sical and quantum computing, Quantum Computing Advantages and li- ntum computing, Quantum Computing in India.	position, Quantum and its properties, mitations, potential	
Mapping of Course	e Outcomes with POs & PSOs PO1, PO2		
Unit V	Modular Physics	(8 Hrs)	
application as FETs based nanomaterial nanotechnology: E energy. Mapping of Course	 Metal oxide nanoparticles TiO2, ZnO, SnO2 and their application in ls and their applications in FETs, MOSFETs, sensors and actuator electronics (GMR effect and its application in read-write head of HDD e Outcomes with POs & PSOs PO1, PO2, PO3 	solar cells, Carbon- s, Applications of), environmental &	
	Learning Resources		
Text Books:	<u> </u>		
1. A Textbook Chand Publi 2. Engineering	c of Engineering Physics, M. N. Avadhanulu, P. G. Kshirsagar & TV ications. g Physics, R. K. Gaur and S. L. Gupta, Dhanpat Rai Publications.	S Arun Murthy, S.	
 Reference Books: Optics, Ajoy Ghatak, Tata Mc Graw Hill Introduction to Solid State Physics, C. Kittel, Wiley and Sons. Quantum Mechanics, A. K. Ghatak, S. Lokanathan, Laxmi Publications. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni, Capital Publishing. Physics for Scientists and Engineers with Modern Physics, Serway and Jewett, Cengage Publications 			
 E-Book Resources: 1. Feynman Lecture series: <u>https://www.feynmanlectures.caltech.edu/</u> 2. Concepts of Modern Physics, Arthur Beiser: <u>https://nitsri.ac.in/Department/PHYSICS/Beiser Modern Physics.pdf</u> 			
MOOC / NPTEL C 1. Lectures by 2. Quantum M <u>https://www</u>	Courses/Other Resources: Walter Lewin: <u>https://www.youtube.com/channel/UCiEHVhv0SBMpP7</u> lechanics Lecture Series by Prof. H. C. Verma: w.youtube.com/playlist?list=PLWweJWdB_GuISnGkAafMpzzDBvTHg(<u>'5JbzJShqw</u>) <u>2At</u>	

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BCC25322A0B: Applied Science for Computer Engineering-II Laboratory					
Teachi	Credit Examination Scheme:				
Practic	cal: 02 hrs. / week	01	Term Work: 25 Marks		
Prereq	uisite Courses, if any:				
Compa	nion Course, if any:				
Course	e Outcomes:				
On con CO1:	Correlate principles of Physi	cs to everyday and complex	engineering problems.		
CO2:	Think out of box with the so	lid foundation of physics to	solve engineering problems.		
1. D 2. T 9 3. T	Guid braw the diagram on the left side the observations will be written age. The graph will face the observation	delines for Student's Lab J e of the first page, in front of ai a on blank age with a pencil, tion table. Show the slope and	ournal m in pencil, on a blank page. followed by the calculations on the same any related calculations on the graph, in		
4. V	Vrite the precautions.				
5. T	he page on which the readings the file as rough readings	are taken in the laboratory wil	l be signed by the teacher and attached to		
1. 2. 3.	Guidelines for Lab /TW Assessment 1. 15 marks for the lab/journal work, which includes 05 marks for timely submission/practical completion, 05 interest shown while performing the practical and 05 marks for file writing, calculations etc. 2. 05 marks for theory attendance. 3. 05 marks for class seminars/viva				
1. 2. 3. 4.	Come with a completed file in the Ensure the file is checked regularies Get the circuit verified before s Do not enter the lab/work in the second sec	the laboratory. arly. witching on the apparatus/circt e lab without an instructor.	uit.		
	L	ist of Laboratory Experim	eents		
	1	Group A (Any two)			
1.	An experiment on Laser (d grating)	etermining the wavelength c	of laser or number of lines on a		
2.	To plot I-V characteristics	and determine fill factor and	efficiency of a given solar cell.		
3.	Synthesis of nanoparticles				
4.	An experiment on propertie	es of nano particles			
1	To determine the divergen	Group B (Any two)			
1. 2	An experiment on Superco	nductor			
3.	3. To determine the diameter of a thin wire using a laser or to perform beam profile analysis of				
Group C (Any three)					
1	To determine the numerica parameters of optical fiber.	l aperture or attenuation coe	fficient or any experiment to calculate		
2	To determine attenuation confiber.	pefficient or any experiment	to calculate parameters of optical		
3	Tunnel diode characteristic	S			
4	Diode characteristics	Comp. Engg C	r.) S. R. Dhore		

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	Group D (Any three)		
1	To determine the band gap energy of a semiconductor sample		
2	Determination of Planck's constant		
3	Compare characteristics of different types of solar cells		
4	To determine Hall coefficient and charge carrier density of a given semiconductor sample		
5.	Virtual experiment on quantum computing (?)		
Useful	Links/Resources:		
1. h	ttps://vlab.amrita.edu/?sub=1&brch=282∼=1512&cnt=1		
2. h	ttps://virtuallabs.merlot.org/vl_physics.html		

3. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html

BCE253203A0A: Foundation of Object-Oriented Programming					
Teaching Scl	heme:	Credit Examination Scheme:			
Theory: 03 h	nrs. / week	03	CIE : 50 Marks ESE : 50 Marks		
Prerequisite	Courses, if any: Pr	oblem Solving Techniques			
Companion	Course, if any: -				
Course Obje Grasp the To use the To provid To lay a f Course Outc CO1: Analyz CO2: Create	ctives: key concepts of Object-oriented par le object-oriented pro oundation for advan- comes: On completion the strengths of object-object of object-oriented participation to be the strengths of object or object or object or object or object of the strengths of object or obj	ject-Oriented Programming (OO adigm in program design. ogramming insight using C++ ced programming. on of the course, learner will be a ject-oriented programming lasses with constructors, method	P) ble to - s, and destructors.		
CO3: Apply CO4: Use vir CO5: Apply	object-oriented softw tual and pure virtual common design patt	function and complex programmers to solve recurring design pr	g ning situations oblems.		
		Course Contents			
Unit I	Fundamenta	ls of Object-Oriented Program	nming (CO1,2)	(10 Hrs)	
Object Orier messages, da Benefits of O C++ Progra structures, Ar Class & Ob separating int members: van Class.	 Object Oriented Programming (OOP), Namespaces, objects, classes, data members, methods, messages, data encapsulation, data abstraction and information hiding, inheritance, polymorphism, Benefits of OOP, C++ as object-oriented programming language. C++ Programming: C++ programming Basics, Data Types, Structures, Enumerations, control structures, Arrays and Strings, function prototype, accessing function & utility functions. Class & Object: class and data abstraction, Access specifiers, Objects and Memory requirements, separating interface from implementation. Constructors and destructor, Types of constructors, Static members: variable and functions, inline function, friend function. Abstract class, Friend Class, Nested 				
Mapping COs	s with POs & PSOs	PO1, PO2, PO3, PO4			
#Exemplar/Ca	ase Studies	Design Library Management Syste	m using OOP Fundamen	tals.	
Unit II	Poin	ters & Exception Handling (C	02,3,4)	(8 Hrs)	
Pointers: declaring and initializing pointers, indirection Operators, Memory Management: new and delete, Pointers to Objects, Pointers Vs Arrays, Function & pointer, Pointers to Pointers, Types of Pointers: this pointer, Null pointer, void pointer, Shared pointers, Weak pointers.Exception Handling: Fundamentals, other error handling techniques, simple exception handling Divide by Zero, Multiple catching, re-throwing an exception, exception specifications, user defined exceptions, processing unexpected exceptions, constructor, destructor and exception handling, exception and inheritance.Mapping COs with POs & PSOsPO1, PO2, PO3, PO5The Memory Manager will dynamically allocate memory for a custom data structure (e.g., a 2D matrix), manage memory operations, and handle					
		access.		anocation, and	

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Unit III	I	nheritance & Polymorphism (CO1,4)	(6 Hrs)		
Introduction to I	nheritance, defin	ning a derived class, Visibility modes and effects, Types of	of Inheritance:		
Single, Multileve	l, Multiple, Hier	rarchical, Hybrid, Virtual base class, Abstract class, C	Constructor &		
Destructors in de	rived class Over	riding Member Functions, Class Hierarchies, Ambiguit	y in Multiple		
Inheritance.					
Introduction of P	olymorphism, 1	ypes of polymorphism	ing Organstan		
Complie time P	olymorphism: F	function overloading, Revision of constructor overload	ing, Operator		
Type cesting (imp	licit and explicit)	Pitfalls of Operator Overloading and Conversion	a Conversion,		
Run Time Polym	ornhism: Pointer	rs to Base class virtual function and its significance in $C+$	+ pure virtual		
function and virtua	al table, virtual de	estructor, abstract base class.	r, pure virtuar		
Mapping COs wit	h POs & PSOs	PO1, PO2, PO3, PO4			
# F l/C6	14 1 °	Process Management System in Operating System			
#Examplar/Case S	Studies	Study about use of C++ SDKs wrappers for Java & .NET.			
Unit IV	File	s Handling & Multithreading (CO1,2,3)	(8 Hrs)		
File Handling: I	Data hierarchy, S	Stream and files, Stream Classes, Stream Errors, Disk	File I/O with		
Streams, File Poir	ters, and Error H	Iandling in File I/O, File I/O with Member Functions, Ov	verloading the		
Extraction and Ins	ertion Operators,	memory as a Stream Object, Command-Line Arguments.			
Multithreading:	Thread, Thread C	ontext, Thread Architecture, Creating & Managing of Thr	eads		
Mapping COs wit	h POs & PSOs	PO1, PO2, PO3, PO4, PO5	l'a dhadaan		
#Exampler/ Case	Studies	written in Visual C++.	lio that are		
Unit V		Generic Programming (CO1,3,5)	(8 Hrs)		
Generic Program	nming: Introdu	uction, Templates: The Power of Templates, Funct	ion template,		
overloading Func	tion templates, a	and class template, class template and Nontype parame	eters, variadic		
Templates, templa	te and friends Ge	eneric Functions.			
Introduction to	STL: STL Com	ponents, Containers- Sequence container and associativ	ve containers,		
container adapters	, Application of	Container classes: vector, list, Algorithms- basic searchir	ng and sorting		
algorithms, min-n	nax algorithm, se	et operations, heap sort, Iterators- input, output, forward	, bidirectional		
and random access	5.				
Mapping COs wit	h POs & PSOs	PO1, PO2, PO3, PO5			
#Exampler/ Case	Studies	Study MySQL open-source C++ code available at GitHub			
		Learning Resources			
Text Books:					
1. E Balagur	usamy Object-O	riented Programming with C++.7th edition.McGraw-Hil	I Publication,		
ISBN 10: 9	9352607996 ISB	N 13: 9789352607990			
2. Tony Gad	dis- "STARTINC	G OUT WITH C++ From Control Structures through Obje	ects", Pearson		
Education	ISBN 13: 978-0	-13-376939-5			
3. Robert La	afore, — Object	t-Oriented Programming in C++, fourth edition, Sam	s Publishing,		
ISBN:0672	2323087 (ISBN 1	3: 9780672323089	-		
Reference Books	<u>`````````````````````````````````````</u>				
1. Matt Weis	sfeld, —The Ob	ject-Oriented Thought Process. Third Edition Pearson	ISBN-13:075-		
206333010	56				
2. Deitel, "C++ How to Program", 4th Edition, Pearson Education, ISBN:81-297-0276-2					
3. D. Vandey	3. D. Vandevoorde, D. Gregor, and N. M. Josuttis, C++ templates. 2nd ed. Boston. MA: Addison-				
Wesley Educational, 2017 ISBN 10: 0-321-71412-1 ISBN-13: 978-0-321-71412-1					
4. Frank B F	Brokken. C++ An	notations Version 13.00.00. University of Groningen			
MOOC / NPTEL Courses/Other Pesourees:					
$1 C_{\perp\perp} \text{ for Programmers on II decity online Learning web portal}$					
2. Learn CLL Programming Reginner to Advance Deen Dive in CLL? exected by Abdul Devi er					
	ling Learning-	beginner to Auvance- Deep Dive III C^{++} created by F	SUGUI DAIT UI		
Odemy online Learning web portal.					
3. Programm	ing in C++, Prof.	Partha Pratim Das from ITT Kharagpur, Swayam web por	tal.		
		Comp. Engg.			

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BCE25323A0B: Foundation of Object-Oriented Programming Laboratory

Teaching Scheme:	Credit	Examination Scheme:
Practical: 02 hrs. / week	01	Term Work: 25Marks

Prerequisite Courses, if any:

Companion Course, if any:

Course Outcomes:

On completion of the course, learner will be able to-

CO1: Understand & apply fundamental OOP concepts.

CO2: Analyze the concepts of file & apply it while storing & retrieving the data from secondary storages. **CO3:** Utilize generic programming for creation of reusable & type-independent code.

Guidelines for Instructor's Manual

The instructor 's manual is to be developed as a hands-on resource and reference. The instructor's manual needs to include prologue (about University/program/ institute/ department/foreword/ preface etc.), Course Syllabus, POs, PSOs, Cos, CO-PO-PSO mapping, Assignment mapping with CO, PO and Blooms taxonomy mapping, conduction & Assessment guidelines, topics under consideration concept, objectives, outcomes, set of typical applications/assignments/ guidelines, and references.

Guidelines for Student's Lab Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of prologue, Certificate, table of contents, and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign, Theory- OOP feature/Concept in brief, algorithm, flowchart, test cases, conclusion/analysis. Program codes with sample output of all performed assignments are to be submitted as softcopy.

As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers as part of write-ups and program listing to journal may be avoided. Use of DVD/One Drive Directory containing students' programs maintained by lab subject Incharge is highly encouraged. For reference one or two journals may be maintained with program prints at Laboratory.

Guidelines for Lab /TW Assessment

Continuous assessment of laboratory work is done based on overall performance and lab assignments performance of student. Each lab assignment assessment will assign grade/marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment assessment include- timely completion, performance, innovation, efficient codes, punctuality and neatness.

Guidelines for Laboratory Conduction

The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. The assignment framing policy need to address the average students and inclusive of an element to attract and promote the intelligent students. The instructor may set multiple sets of assignments and distribute among batches of students. Encourage students for the use coding standards such as appropriate use of Hungarian notation, proper Indentation and comments. Use of open source software is encouraged. Instructor may also assign one real life application in the form of a micro-project. Based on the concepts learned.

List of Laboratory Experiments

Group A: Fundamentals Concepts (Any two)

Write a C++ program create a calculator for an arithmetic operator (+, -, *, /, %). The program should take two operands from user and performs the operation on those two operands depending upon the operator entered by user. Use a switch statement to select the operation. Finally, display the result.

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	The customers of the Maharashtra State Electricity Board (MSEB) are charged depending on the number of units consumed. The electricity tariff is calculated as follows:			
		Units Consumed	Charges	
2.		Upto 100 units	90 paise per unit	
		More than 100 and upto 200	Units Rs. 1 per unit	
		More than 200 units	Rs. 1.30 per unit	
	In addition to above ever C++ using control structure	y person has to pay Rs75 res to calculate the Electrici	as service charge per m	onth. Write a program in
3.	Develop a Menu driven containing the following static totalAccounts, etc. destroying the data viz.	C++ program to create a information accountNum construct the database w constructor, destructor, sta emory allocation operators	database of Bank Acc ber, accountHolderNam ith suitable member fu tic member functions,	count information system ne, balance, interestRate, unction for initializing & friend class, this pointer,
4.	Write a C++ program to display all prime numbers	store N nos. in array and from the array all perfect	display the square of e	ach number in the array,
	Group B: Inheritance	& Polymorphism Group	p (Any two for each P	Practical Batch)
1.	Develop a C++ program t column, **data). Impleme a) Parameterized Constru- b) Overload operator + to c) Overload operator - to d) Overload operator* to e) Overloaded << and >> f) Destructor for releasing	hat demonstrates operator of ont the following operations actor (which creates matrix o add two Matrices. o subtract second matrix from multiply two matrices. > to print and read matrices ag allocated memory.	overloading by implements: with rows, column). om first matrix.	nting a Matrix class (row,
2.	Implement a class Quad ax2+bx+c. The class will following operations: a) A constructor (includi b) Overloaded operator+ c) Overloaded << and >> want your input and o d) A function eval that compu- e) A function that compu-	Iratic that represents deg I require three data memb ng a default constructor wh to add two polynomials of > to print and read polynom utput format to look like. computes the value of a poly ttes the two solutions of the	ree two polynomials i. ers corresponding to a, nich creates the 0 polynomials degree 2. nials. To do this, you wil ynomial for a given value e equation ax2+bx+c=0.	e., polynomials of type b and c. Implement the mial). l need to decide what you e of x.
3.	 Create a class Rational Nu a) Create a constructor that are not in reduced form b) Overload the addition c) Overload the relational 	mber (fractions) with the feat prevents a 0 denominate m and avoids negative deno , subtraction, multiplication l and equality operators for	ollowing capabilities: or in a fraction, reduces optiminators. and division operators for this class.	or simplifies fractions that for this class.
4.	Write C++ Program with hold the initial values and getVal2() and getResultant calculations are fixed and will inherit OhmsLaw. Ho a pure virtual function that compute () will be determ	h base class OhmsLaw dec nd converted value, respe t(), which return the initial l applicable to all derived owever, the function that w t must be defined by the cla ined by what type of Calcu	clares three variables, va ctively. It also defines value and the calculated classes (i.e. Voltage, C ill actually perform the c asses derived from conve lation is taking place.	all, val2 and result which the functions getVal1(), value. These elements of urrent & Resistance) that calculation, compute (), is ert. The specific nature of
5.	Design and develop inh implement inheritance w Mail_id, and Mobile_num Manager and Project Mar inherited classes with 50% club fund. Generate pay handling mechanism to Va	eritance for a given case wherever applicable. Emp ber members. Inherit the cl nager from employee class of BP as DA, 17 % of BF slips for the employees alidate BP to be non-negati	e study, identify object ployee class hasEmp_n lasses: Programmer, Tea s. Add Basic Pay (BP) P as HRA, 12% of BP as with their gross and n ve and handle invalid in	ts and relationships and hame, Emp_id, Address, m Lead, Assistant Project as the member of all the s PF, 0.1% of BP for staff et salary. Use exception put for employee details.

6.	Develop a C++ program that uses class Device which represent a general device with attribute name & status also has virtual methods turnOn() and turnoff(). Class PowerDevice inherits from Device and include power related attributes like powerConsumption and method getPowerConsumption() to get power consumption. Another class NetworkDevice which inherited from Device and includes network related attributes like ipAddress and methods connect() and disconnect() for connect and disconnect the device. There is one more class name as SmartLight which inherits from both PowerDevice & NetworkDevice representing smart light with capabilities of both classes and has attributes like brightness and color and has methods adjustBrightness() for adjusting the light brightness and changeColor() for changing Light color. Program will also handle exceptions for scenarios such as invalid power consumption, network disconnection, and device malfunction, etc.
	Group C: File Handling (Any two)
1.	Write a C++ program to count number of characters, number of words, number of sentences, number of alphabets and number of digits in file.
2.	Write a menu driven program that will create a data file containing the list of Employees & theirSalary details in the following form1522 John95001651 Patric Samsung3500018200 7000602054180Use class object to store each set of data, access the file created & implement the following tasksa)Create New Record.b)Determine the Employee Record of the specified Employee namec)Determine the Employee Record of the specified Employee idd)Update the Employee Salary details, whenever there is a change.
3.	Write a C++ program using command line arguments to search for a word in a file and replace it with the specified word. The usage of the program is shown below. \$ change <old word=""> <new word=""> <file name=""></file></new></old>
4.	Write a C++ program for creation of Symbol table & Tokenization for given C/C++ program.
	Group C: Generic Programming (Any three)
1	Write menu driven program for sorting Techniques (Bubble, Selection, Insertion) using class template. Program must input, sorts and outputs an integer array, float array, long array, character array.
2	Write C++ program using STL for sorting and searching with user defined records such as person record (Name, DOB, Telephone number), Item record (Item code, name, cost, quantity) using vector container
3	Write C++ program using STL to add binary numbers (assume one bit as one number); use STL stack.
4	Write a program that opens a text file and reads its contents into a STL stack. The program should then pop the characters from the stack and save them in a second text file. The order of the characters saved in the second file should be the reverse of their order in the first file
Usef	ul Links/Resources:
1.	E Balagurusamy Object-Oriented Programming with C++.7th edition.McGraw-Hill Publication, ISBN 10: 9352607996 ISBN 13: 9789352607990
2.	Tony Gaddis- "STARTING OUT WITH C++ From Control Structures through Objects", Pearson Education, ISBN 13: 978-0-13-376939-5

3. Virtual Lab: https://cse02-iiith.vlabs.ac.in/Introduction.html

BEC25324A0A: Basic Electrical & Electronics Engineering					
Teaching Sche	Credit Examination Scheme:				
Theory: 03 hrs	s. / week	03	CIE:	50 Marks	
Proroquisito C	ourses if one. El	atron theory Ohme	ESE:	50 Marks	
r rerequisite C	Sei	niconductor theory	law, Magnetis	sin, Number system,	
Companion Co	ourse, if any: En	gineering Science S	ubjects		
Course Object	ives:				
 To provide To build str diagram rep 	working knowledg ong conceptual un resentation.	ge for the analysis of inderstanding of sing	f basic DC circ gle phase and p	uits. polyphase AC circuit	s with phasor
• To impart b	asic knowledge fo	r conceptual unders	tanding of DC	and AC machines.	
 To understa To understa 	and the construction and basics of comb	inational logic. Boo	lean algebra ar	1 nd flip -flops.	
Course Outcor	nes: On completic	n of the course lea	mer will be abl	e to -	
CO1: Apply the related to r	knowledge of DC magnetic circuits.	circuits to solve the	complex netwo	orks and to define the	e various terms
CO3: Demonstra CO4: Design sin	ate the constructional nple analog circuits	I features and operation using these devices	onal details of D	C and AC machines.	ical quantities.
CO3. Build sing		Course Co	ontents		
Unit I		Electric and Mag	netic Circuit		(8 Hrs)
Magnetic Circu units and relation Electromagneti	it: concept of Flunships; comparison ism: Faradays law of	x, flux density, reluction of electric and magnetic in	etance, MMF, patient circuit.	bermeability and field	strength, their luced EMF
				+, FO7, FS01	(9.11)
		ngle and Three Ph	ase AC Circui		(8 Hrs)
Single phase AC Circuits: AC Quantities, Single phase ac circuit analysis (R, L, C, R-L, R-C and R-L-C series) on the basis of impedance, admittance, voltage current and power waveform, concept of active, reactive, apparent power and power factor Three phase AC Circuits: Introduction to 3 phase supply and its necessity, balance three phase system, relation between line and phase quantities (with phasor diagram), power in three phase circuits for star and Delta connection.					
Mapping of Cou	irse Outcomes with	n POs & PSOs	PO3, PO5, PO	7, PO11, PSO2	
Unit III		Electrical	Machines		(8 Hrs)
equation of D. C. generator (numerical), concept of Back emf in DC motor (Numerical), Industrial applications. Transformer: Single phase transformers: Construction, operating principle, emf equation, voltage and current ratios. Losses, Efficiency and regulation, Auto-transformer, Sensors used for protection of machines. Sensors for Electric Motors					
Mapping of Cou	urse Outcomes with	n POs & PSOs	PO1, PO2, PO3	3, PO4, PO5, PO6, PS0)1
		Comp. Engg.)	Prof. (Dr.) S	. R. Dhore	
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Unit IV	Analog el	ectronics	(8 Hrs)			
Diode : Ordinary Diode: Construction, symbol, working, characteristics. Application of diode: Half wave, ull wave and bridge rectifiers. Fransistor: Construction, types, operation; transistor configuration (CE, CB and CC): characteristics, elationship between α and β , load line for a transistor, application of transistor as a switch and amplifier. Operational Amplifier: Functional block diagram of operational amplifier, Ideal & practical values of performance parameters.						
Mapping of Course	e Outcomes with POs & PSOs	PO1, PO5, PO6, PO7, PSO2				
Unit V	Digital el	ectronics	(8 Hrs)			
Logic Gates: Fund universal gates Combinational L representation of lo Sequential Logic Triggering.	Logic Gates: Fundamental, derived and exclusive logic gates: symbol, operation, truth table, concept of universal gates Combinational Logic Circuit : Reduction of digital expressions by Boolean algebra, standard representation of logic functions (SOP and POS forms), and De Morgan [*] s Theorem, half and full adder Sequential Logic Circuit : Flip – Flop (SR, JK & T): construction, working, truth table; types of Triggering.					
Mapping of Course	e Outcomes with POs & PSOs	PO4, PO9, PO10, PSO2				
	Learning R	esources				
 Theory and Ltd. Basic Electri Modern Dig Digital Com Reference Books: A textbook New Delhi, Floyd, Electrical AP Malvino edition), (20 Electrical T Digital Fund Digital desig Op-Amps at Digital com MOOC / NPTEL Fundamenta Electrical M Digital Circ Basic Electrix 	problems of Basic Electrical Engineer rical Engineering by V. N. Mittal and A rital Electronics by R.P. Jain, 4th Editi imunications, by John G. Proakis, Tata of Electrical Technology Vol I by B. I 1st Edition. ronic Devices and Circuits, pearson ea & Donald Leach, 'Digital Principles a 09) echnology by Edward Hughes, 10th E damentals by Thomas L Floyd, 10th E gn by M. Morris Mano, 3rd Edition (P nd Linear Integrated Circuits by Rama munication by Sanjay Sharma Courses/Other Resources: Ils of Electrical Engineering: https://npt Iachine: https://nptel.ac.in/courses/108 uits: https://nptel.ac.in/courses/11710	ing by I. J. Nagrath and Kothari, PHI le Arvind Mittal, 2nd Edition. (McGrawHi on, Tata McGrawHill a Mcgraw Hill Publications Theraja and A. K. Theraja S. Chand & ducation, (7th edition),(2008) nd Applications', McGraw Hill Education dition (Pearson). dition (Pearson). earson) kant AGayakwad (Pearson) ptel.ac.in/courses/108105112 2005155 3064 03063	earning Pvt. 11), & Co. Pvt. Ltd. on,(6 th			

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BEC25324A0B: Basic Electrical Engineering Laboratory						
Teach	ching Scheme: Credit Examination Scheme:					
Practio	cal: 02 hrs. / week	01	Term Work:	25 Marks		
Prereq	uisite Courses, if any: 12 th	standard Physics				
Compa	anion Course, if any: Scien	ce subjects of First year	Engineering			
Course	e Outcomes:					
On con $CO1^{\circ}$	npletion of the course, learne Demonstrate AC and DC c	er will be able to- ircuits by performing diff	erent experimen	ts		
CO1:	Demonstrate AC and DC e	nachines by performing di	ifferent experim	ents		
	Gui	idelines for Student's La	b Journal			
The stu	idents Lab Journal should con Title of the experiment	ntain following related to e	every experiment	t –		
2.	Objective					
3.	Apparatus with their detail	ed specifications				
4.	Brief theory related to the	experiment				
5.	Connection diagram /circu	it diagram				
6.	Observation table					
7.	Sample calculations for on	e/two reading				
8.	Result table					
9.	Graph and Conclusions					
1. 2. 3.	Continuous assessment of la Laboratory performance of a Each Laboratory assignment appropriate weightage. Suggested parameters for over timely completion, performance	aboratory work is to be do student. t assessment should assig verall assessment as well a ance, efficiency, punctual	ssessment one based on ove n grade/marks b as each Laborato ity, and neatness	erall performance and ased on parameters with ory assignment include- 3.		
1. 2. 3. 4.	Guid All the experiments (Any E Use of open source softward Come with a completed file Ensure the file is checked re	delines for Laboratory C ight) mentioned in the syl e and recent version is to b in the laboratory. egularly.	Conduction labus are compu been courage	llsory.		
	Lis	st of Laboratory Exp	eriments			
1.	Introduction of different ele	ectrical and electronics co	mponents and ir	nstruments.		
2.	To perform electrical wirin	g to control lamps using o	one way and two	o-way switches.		
3.	To measure steady state res of voltage and current wave	sponse of series RL and R eforms.	C circuits on AC	C supply and observations		
4.	To derive resonance freque	ncy and analyze resonanc	e in series RLC	circuit.		
5.	To perform load test on sin efficiency.	gle phase transformer to c	letermine voltag	e regulation and		
6.	To verify the relation betwee connections of load.	een phase and line quantit	ies in three phas	e balanced star and delta		
7.	Speed control of DC motor	TUTE OF TE	62			
		Comp. Engg.	(Dr.) S. R. Dhoi	e		

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8.	To determine output voltage and ripple voltage of half wave, full wave rectifier with center tap transformer and bridge rectifier with and without filter
9.	To Plot input and output characteristics of CE Transistor configuration.
10.	Verify its truth table SR, JK & T flip flops
11.	Implementation of Half Adder & Full Adder using Logic Gate IC"s.
12.	Introduction of different electrical and electronics components and instruments.
Usefu	l Links/Resources:
1.	https://www.vlab.co.in/broad-area-electrical-engineering
2.	https://nptel.ac.in/courses/108105155
3.	https://be-iitkgp.vlabs.ac.in/
4.	4. https://de-iitr.vlabs.ac.in/

BCC25325A0X: Design Thinking Innovation & Prototyping						
Teaching Sch	eme: Credit Examination Scheme:					
Theory: 01 I	heory: 01 Hrs. / week 01 CIE: 50 Marks					
Prerequisite	Courses, if any: N	NIL				
Companion (Course, if any: NI	L				
Course Obje Understam Apply kno Develop cr Demonstra Evaluate a Develop a Course Outco CO1: Generate CO2: Concept specifica CO3: Prototyp	 Course Objectives: Understand the core principles of design thinking and its role in engineering. Apply knowledge of design thinking to analyze and solve complex problems. Develop creative and user-centered solutions to real-world challenges. Demonstrate effective communication and collaboration in multidisciplinary teams. Evaluate and analyse design concepts and prototypes. Develop a mindset for continuous innovation and improvement. Course Outcomes: On completion of the course, learner will be able to – CO1: Generate innovative ideas and solutions through brainstorming and ideation. CO2: Conceptualize a product based on design requirements and evaluate prototypes to validate design specifications. CO3: Prototype and test design solutions to refine and improve them 					
CO4: Present a CO5: Collabor	and communicate de ate with peers and i	esign ideas effectively ndustry professionals to addre	ess real-world	design challenges.		
		Course Conte	nts			
Unit I		Redefining Problem	(CO1)		(03 Hrs)	
OIOR tool, re will function	edefining problem in real world scena	statement, Storyboarding, arios, user journey/interacti	visual repres	sentation of how act, Persona creat	the prototype tion	
Mapping of C	ourse Outcomes wi	ith POs & PSOs	PO: 03, 06			
Unit II		Concept Evaluation (CC	D2&CO3)		(03 Hrs)	
Ideation: Syn Concept maps paper prototy	ectics, Analogical s. Introduction to F pes, Mockups with	thinking, Metaphors, Insp Process of Prototyping, rou a clay, paper, wood, etc.	iration from n gh sketches, v	ature, Concept e vireframes, draft	valuation, layouts,	
Mapping of C	ourse Outcomes wi	ith POs & PSOs	PO: 04, 09, 1	1		
Unit III		Prototyping (CO2&	CO3)		(03 Hrs)	
Minimum Via in order to ge Factors / Ergo	able Product, Proo et feedback from pnomics, Systems 1	f of Concepts (PoC) (to de its users), medium prototy Mapping, Hi-fidelity proto	monstrate the yping. Process typing, Hard I	feasibility of the s of final prototy prototyping.	core Concept yping: Human	
Mapping of C	ourse Outcomes wi	ith POs & PSOs	PO: 03, 04, 05	5		
Unit IV		User Feedback (CO3, CO	04 &CO5)		(02 Hrs)	
Usability Studies and User Feedback: User feedback on product before, during and after usage, Observation of product usage in Natural settings and Observation in Laboratory/Workshop settings, User feedback evaluation.						
Mapping of C	ourse Outcomes wi	ith POs & PSOs	PO: 09, 10			
Unit V		Business Model (CO3,CO	04 &CO5)		(03 Hrs)	
Innovative Business Model (Key resources, Revenue streams, Cost structure, Customer segment, Channels to reach customer future plan), SWOT & SWOR Analysis, Pitch presentation						
Mapping of C	ourse Outcomes wi	ith POs & PSOs	PO: 01 to 11			
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Computer En	gmeering, AIT Pu	Ar PUNE.15 Ar Di	my Institute of ghi Hill's,Pune	- 15.	rage 33 01 03	

Group Structure:

- 1. Working in faculty monitored groups. The students plan, manage and complete a task / project / activity which addresses the stated problem.
- 2. There should be a of team / group of 3 4 students.

Learning Resources

Reference Books:

- 1. Design Thinking: Understanding How Designers Think and Work by Nigel Cross
- 2. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation" by Tim Brown
- 3. Design Thinking for Visual Communication" by Ranjan Nayar and Jaidip Subedi
- 4. The Design of Everyday Things" by Don Norman• "Design Thinking: Creativity and Innovation" by S. Balaram
- 5. Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days" by Jake Knapp
- 6. Creative Confidence: Unleashing the Creative Potential Within Us All" by Tom Kelley and David Kelley (with a foreword by Ratan Tata)

MOOC / NPTEL Courses/Other Resources:

- 1. https://swayam-plus.swayam2.ac.in/courses
- 2. https://swayam.gov.in/explorer
- 3. https://nptel.ac.in/courses

Guidelines for CIE (50)

- 1. First evaluation based on presentation to be conducted around midterm for 10 marks.
- 2. Second presentation to be conducted at the time of submission for 10 marks.
- 3. The evaluation of the submitted report for 10 marks.
- 4. The final hard prototype will be evaluated for 20 marks.
 [Creativity and originality (05), Clarity and completeness (05), Justification of prototype features (05), Quality (05)]

Prof. (Dr.) S. R. Dhore Head of Computer Department Army Institute of Technology Dighi Hill's,Pune - 15.

BCC25325A0X: Design Thinking Innovation & Prototyping Laboratory								
Teach	ing Scheme:	Credit	Examination	Scheme:				
Practi	cal: 02 hrs. / week	01	Term Work:	25 Marks				
Prereq	Prerequisite Courses, if any: Basic Mathematical concepts.							
Comp	Companion Course, if any:							
Course On com CO1: V CO2: C	 Course Outcomes: On completion of the course, learner will be able to– CO1: Work in team to think out of box with the solid foundation of Design thinking and ideation concepts. CO2: Create Prototype of Problem present and document the same 							
1 Dre	Guid	elines for Student's Lab Journ	nal	aka your work alaar				
and	l presentable.	Tou can use coloured penchs/sket	ch pens etc to m	ake your work clear				
2. The	e content will be written on one s	ide ruled pages. ank side						
<i>5.</i> Th	Guid	lelines for Lab /TW Assessme	nt					
1. 15	marks for the lab / journal work,	which includes 5 marks for timely	submission / task	completion, 05				
inte 2. 05	erests shown in the classroom and marks is for theory attendance.	l laboratory and 05 marks for file v	vriting.					
3. 05	marks class presentations.							
1. Co	Guid me with a completed file.	elines for Laboratory Conduc	tion					
2. Ens	sure the file is checked regularly.							
3. Par 4. Con	mplete your tasks on time.							
	Li	ist of Laboratory Experiments	5					
1.	Using OIOR or some other app	ropriate tool redefine the problem	statement					
2.	Submit a completed storyboard form and in text of 200 words)	d outlining the user experience will Use the relevant diagrams/flow ch	th your prototype arts/pictures	e. (both in graphical				
3.	Design a function map for charts/pictures.	the persona using your produc	t. Use the rele	evant diagrams/flow				
4.	Draw a concept Evaluation map	o along with a text of 200 words de	escribing it.					
5.	Write 200 words report on the soft prototype created with the relevant diagrams/flow charts/pictures, with a list of features to be included in the prototype.							
6.	Create a mind map for proof of	concept of your idea. Explain it in	200 words.					
7.	Write a detailed report of 300 words on the hard prototype created, along with the relevant diagrams/flow charts/pictures.							
8.	Discuss user feedback on yo charts/pictures.	our prototype in 300 words alor	ng with the rele	evant diagrams/flow				
9.	Draw an evaluation matrix and	a map of user feedback and the act	ions taken in 200) words.				
10.	Make a Business model of you analysis and the pitch.	ur idea, giving it a title, mission e	etc along with its	SWOT and SWOR				

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BCC25226A0X: Entrepreneurship Skills and Professional Ethics						
Teaching Scheme:	Credit	Examination So	cheme:			
Theory: 02 hrs. / week	02	CIE: 50 Marks				
Prerequisite Courses, if any: -]	NA					
Companion Course, if any: - I	NA					
 Primary objectives: Primary objective of the con "Entrepreneurship", its signing an overview of process of bur Introduce fundamental conce Develop basic entrepreneuria Foster financial and marketin Understand of professional a Acquaint with leadership and 	 Course Objectives: Primary objective of the course is to give students a basic understanding and awareness about "Entrepreneurship", its significance and skills required to pursue the same. The course also gives an overview of process of building a startup. Introduce fundamental concepts of entrepreneurship Develop basic entrepreneurial skills Foster financial and marketing literacy for startups Understand of professional and ethical responsibility 					
 Course Outcomes: On completion of the course, learner will be able to - CO1: Identify various types of entrepreneurship, discuss its economic impact, and outline the entrepreneurial mindset and characteristics of successful entrepreneurs CO2: Perform basic ideation, identify viable opportunities, and create a simple business plan, including understanding key elements of a business model CO3: Apply basic budgeting, funding options, and marketing strategies relevant to new businesses and identify ways to reach and satisfy customers. CO4: Understand and apply ethical principles, resolve ethical dilemmas responsibly, and recognize the role of corporate social responsibility in modern business. CO5: Exhibit essential leadership qualities, work effectively in teams, manage conflicts, and make 						
	Course Contents					
Unit I Introduction to	Entrepreneurship and the Entrepre	neurial Mindset	(08 Hrs.)			
To provide students with foundated development, types of entrepreneur Basics of Entrepreneurship: Defective Basics of Entrepreneurship: Defective Basics of Entrepreneurship: Defective Basics of Entrepreneurship an Entrepreneurial Micro, Small, and Medium Enterpective Developing an Entrepreneurial resilience. Understanding Different Domain Manufacturing, Entrepreneurship of Activities: Quiz on definitions and type Role-play scenarios focusited and the state of th	ational knowledge of entrepreneurship rship, and the entrepreneurial mindset. inition, characteristics, and types of ent How entrepreneurship drives innovation rises Mindset: Characteristics, and skills ins Entrepreneurship: Techno, Social etc. bes of entrepreneurship. ng on decision-making and risk-taking. ecture on diverse entrepreneurial domain rs' success story / A Successful MSME.	o, covering its role repreneurship. n and growth. Differ like risk-taking, cr , Women, Healthcard	in economic ent models – eativity, and e, Education,			

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Unit II		The Entrepreneurial Proc	cess and Business Models	(7Hrs)
To enable students to identify business opportunities, understand the entrepreneurial process, and create simple business models. Ideation and Opportunity Recognition: Generating and evaluating business ideas. Feasibility and Business Planning: Basics of market research and planning. Business Models: Overview of various models (B2B, B2C, subscription, etc.). Components of a Business Plan: Key elements of a simple business plan. Activities: 1. Group ideation exercise to generate start-up ideas. 2. Workshop on creating a simple business plan. 3. Role-play exercise to explain different business models to a layperson. 4. Interactive session on key business plan components				
Mapping of C	Cours	e Outcomes with POs & PSOs	PO6 – PO11, PSO1	
Unit III		Professional Ethics and Corpo	orate Social Responsibility (CSR)	(7 Hrs)
 To help students recognize the importance of ethics in engineering and business, promoting integrity, accountability, and social responsibility in their professional behavior. Introduction to Ethics: Importance and principles of ethics in personal and professional life. Professional and Engineering Ethics: Ethics in management, organizational Ethics, Ethical aspects of Marketing, Intellectual property and Ethics Corporate Social Responsibility (CSR): Basics and examples. Case Studies on Common Ethical Dilemmas in Engineering and Business Activities/ Tutorial Group activity to identify unethical practices in real-world case studies. Case study analysis on ethical issues in engineering and management. Workshop on integrating CSR into business strategies. Role-play scenarios depicting ethical dilemmas. 				
Mapping of C	ours	e Outcomes with POs & PSOs	PO6 – PO11, PSO1	
Unit IV		Leadership a	and Team Work	(7 Hrs)
 Leadership and Team Skills: Effective communication, teamwork, and conflict resolution. Compliance and Social Responsibility: Environmental and societal obligations. Human Resource Management, Customer Care Trends and Future Opportunities in Entrepreneurship: Emerging fields like green tech and digital transformation Activities/ Tutorial Conduct a role-play simulating leadership challenge. Case study - Environmental compliance in businesses. Guest lecture / Workshop on effective customer service techniques. Role-play customer service scenarios Mapping of Course Outcomes with POs & PSOs 				
Mapping of Course Outcomes with POS & PSOS PO0 – PO11, PSO1				

BCC25226A0X: Entrepreneurship Skills and Professional Ethics Tutorial				
Teachi	ing Scheme:	Credit	Examination Scheme:	
Tutori	al: 01 hr / week	01	Term Work: 50 Marks	
Prereg	uisite Courses, if any: NIL		·	
Compa	anion Course, if any: NIL			
Course Outcomes: On completion of the course, learner will be able to– CO1: Student will have awareness about each component of business. CO2: Student will be able to define a minimum viable product for an innovative idea				
Every E	Gui Experiment is to be written and	delines for Student's Lab Journa completed using given template by fac	l ulty.	
Guidelines for Tutorial Assessment For TW assessment - weightage given to Attendance, Participation in each activity, Completion of Assignment, In time Submission				
Minimu	10 assignments to be comple	eted		
]	List of Laboratory Experiments		
		UNIT 1		
1.	Create a comparative chart / info graphic poster highlighting key features of each domain (e.g., social vs. tech entrepreneurship).			
2.	Case study: Successful Wome	en Entrepreneur / Social Entrepreneur /	Any other	
		UNIT 2		
3.	Conduct a group ideation exercise to generate start-up ideas. Create a mind map connecting various business opportunities in a given sector.			
4.	Conduct Market research for	he initiated idea and analyse the same.		
		UNIT 3		
5.	Develop a mini business plan	or a business model canvas for a new i	idea.	
6.	Create a simple marketing stra	ategy or pitch deck for a business idea.		
UNIT 4				
7.	7. Enlist various funding resources for a startup and create a comparative chart of advantages and disadvantages of funding sources.			
8.	Study of different types of companies with significance of each. Register your hypothetical company for any suitable type. Complete hypothetically the registration process.			
9.	. Study and Analyse different categories of IPR relevant to your business.			
UNIT 5				
10.	Analyze a case study on an ethical dilemma in engineering or business. And create a visual representation (poster/video) of ethical principles.			
11.	11. Write a report on best HR practices in startups.			
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Learning Resources

Text Books:

- Entrepreneurship Development and Management by S. S. Khanka, S. Chand Publishing Focus: This book provides a comprehensive introduction to entrepreneurship, focusing on Indian entrepreneurial scenarios. It includes topics on startup strategies, government initiatives, and managerial skills.
- Fundamentals of Entrepreneurship by H. Nandan, PHI Learning Focus: This book explains entrepreneurship concepts with a focus on small and medium enterprises (SMEs) in India. It provides insights into entrepreneurial competencies, business planning, and government support systems.
- 3. Engineering Ethics by Charles B. Fleddermann, Pearson Education Focus: This book focuses on engineering ethics, covering case studies, ethical theories, and professional responsibilities. It's particularly suitable for students looking to understand ethical considerations in engineering practices.

Reference Books:

- Innovation and Entrepreneurship by Peter F. Drucker, Harper Business
 Focus: Drucker's classic text explores how innovation drives entrepreneurship. It's ideal for understanding the
 role of creativity and innovation in the entrepreneurial process.
- The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses by Eric Ries, Penguin Random House Focus: This book introduces the lean startup methodology, focusing on rapid prototyping, validated learning, and customer feedback. It's helpful for understanding modern approaches to building startups.
- 3. Ethics in Engineering by Mike W. Martin and Roland Schinzinger, McGraw-Hill Education **Focus:** This book provides a thorough overview of ethical responsibilities for engineers, covering case studies and moral dilemmas in engineering.
- 4. Entrepreneurship by Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, McGraw-Hill Education **Focus:** This is an advanced textbook on entrepreneurship, covering opportunity identification, venture capital, and managing growth. It provides an international perspective with case studies and examples.
- Corporate Social Responsibility in India by Sanjay K. Agarwal, SAGE Publications
 Focus: This book covers CSR from an Indian perspective, discussing relevant policies, case studies, and CSR strategies. It's useful for understanding the ethical and social responsibilities of businesses in India

MOOC / NPTEL Courses/Other Resources:

- 1. Entrepreneurship Development Course- Wharton Entrepreneurship Specialization by the University of Pennsylvania on Coursera
 - **Focus:** This course covers the full entrepreneurial journey, from idea generation to business growth. It's a comprehensive series that addresses opportunity identification, market analysis, and securing financing, ideal for beginners and early-stage entrepreneurs
- Professional Ethics Course, Global Impact: Business Ethics by the University of Illinois on Coursera: Focus: This course introduces foundational business ethics and its application in global contexts, covering issues like corporate responsibility and ethical decision-making in various industries.
- 3. Entrepreneurship Development Program (EDP), by Thought Power <u>https://www.youtube.com/watch?v=pseWtIpC5ko&t=3s</u>

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BCC25227A0X: Life Skills & Liberal Learning					
Teaching Scheme:	Credit	Exam	ination Scheme:		
Theory: 01 hr / week	01	TW:	50 Marks		
Prerequisite Courses, if any: - N	JA				
Companion Course, if any: -N	A				
Course Objectives:					
• Students select their interests	from a list of Co-curricu	lar Courses fro	om the basket. Courses are		
conducted by course experts t	hrough activities, discussion	ns, presentation	ns, and lectures.		
• Students must submit a report	on their activities related to	the chosen co	urse. For online courses on		
Swayam, NPTEL platform,	completion/grade certifica	te submission	is mandatory. Evaluation		
Course Outcomes: On completion	on of the course learner wil	l be able to -			
CO1: Understand basic concept	of the selected course.				
CO2: Learn co-curricular course	that aligns his / her interes	t.			
CO3: Enrich educational experie	ence.				
CO4: Explore strengths and tale	nts outside of academics				
Basket of Co-curricular Course	:				
1. Yoga and Meditation	2.	Yoga and Mee	litation		
3. Dancing	4.	Dancing			
5. Singing	6.	Singing	. ~		
7. Basics of Music Comp	osition 8.	Basics of Mus	ic Composition		
9. Painting	10). Painting			
Here are some t	ips and ideas to help you	choose the righ	nt courses		
1. Consider Your Interests and H	Hobbies. Think about what	you enjoy doin	g in your free time or what		
activities you have always v	vanted to try. Co-curricula	r courses can	be a great opportunity to		
pursue passions outside your p	major.		n maarida o mall normalad		
2. Explore Different Fields. Cl	2. Explore Different Fields. Choosing courses from different areas can provide a well-rounded				
experience. Balance Your Schedule Ensure that the co-curricular courses fit well with your academic schedule.					
and personal commitments. Avoid overloading yourself, as these courses should enhance your					
experience, not add undue stress.					
4. Look at Course Benefits Some co-curricular courses offer skills that can be beneficial in your					
future career or personal development.					
5. Consult with Advisors or Seniors Talking to academic advisors, professors, or senior students can					
give you insights into which courses are popular, have good instructors, or offer valuable					
experience					
MOOC / NPTEL Courses/Other Resources:					
1. <u>https://swayam-plus.swayam2.ac.in/courses</u>					
2. <u>nttps://swayam.gov.in/explorer</u> 3. https://nptel.ac.in/courses					

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BCC25328A0X: The Constitution of India					
Teaching S	Teaching Scheme: TH:01CreditExamination Scheme:				
Online Learnin lectures, Hands	ng, P s-on	resentations, MOOC courses, Guest Assignments, Team Activities etc	(Mandatory Non- Credit Course)	Audit Course	
Prerequisite	Co	urses, if any: NIL			
Companion	Cou	ırse, if any: NIL			
Course Obje	ectiv	res:			
 To learn an To learn and 	ind u ind u	nderstand the democracy and its advant nderstand parliamentary system and its	ages. working		
To learn anTo learn and	ind u ind u	nderstand provisions made in Constitut nderstand constitutions of other Countr	ion of India. ies and global perspec	ctive.	
Course Outo	com	es: On completion of the course, lea	rner will be able to	-	
CO1: Explai	uin va rstai	arious aspects of democracy and parlian	nentary system		
CO3: Apply	y the	concepts of Sustainable Development (Goals in his life and v	vork.	
		Course C	ontents		
Unit I		Democr	racy		(2 Hrs)
Society, Nation and its constitution, Various Definitions of democracy, Definition of Democracy in Indian context, Dimensions of Democracy- Social, Economic, and Political Necessary conditions for successful working of democracy					
Mapping of C	Cour	se Outcomes with POs & PSOs	PO1, PO2, PO3, 1	PO7, PO8, PO10	
Unit II		Parliamentar	ry System		(3 Hrs)
Parliamentary system of democracy, Pillars of Indian democracy, Separation of power, Elections: Political party- Registration, Rules for Recognition, Delimitation Commission: Constitutional Provisions					
Mapping of C	Cour	se Outcomes with POs & PSOs	PO1, PO2, PO3, 1	PO7, PO8, PO9, P	D10
Unit III	Unit IIIThe Constitution of India(3 Hrs)				(3 Hrs)
Preamble, Overview of The Constitution of India (COI), Definition of State, Fundamental rights, Fundamental duties, Directive Principles of state policies, Themes for understanding our Constitution, Constitutional morality					
Mapping of C	Cour	se Outcomes with POs & PSOs	PO1, PO2, PO3, 1	PO7, PO8, PO9, P	D10
Unit IV		Amendment of 7	The Constitution		(2 Hrs)
Basic structure doctrine, Power of Parliament to amend the Constitution and procedure therefor, Procedure for Amendment of The Constitution before and after 42nd Amendment Case studies: Self case study of 24th and 42nd Amendment.					
Mapping of C	Cour	se Outcomes with POs & PSOs	PO2, PO3, PO6, 1	PO7, PO8, PO11	
Unit V		Comparati	ive Studies		(2 Hrs)
Comparison of COI and Constitution of Presidential system (e.g. USA), Constituent Assembly of India and Constituent assembly of Pakistan, COI and Constitution and situations in neighboring countries like Pakistan, Bangladesh, Nepal etc.					
Mapping of Course Outcomes with POs & PSOsPO2, PO3, PO6, PO7, PO8, PO9, PO11					
Unit VI		Global pe	erspective		(3 Hrs)
Human and Sustainable Development, Global goals for Sustainable development and The Constitution of India, Challenges for India and its solutions within constitutional framework. COI & PESTLE analysis					
Mapping of Course Outcomes with POs & PSOsPO2, PO5, PO6, PO7, PO8, PO9, PO11					
		Dept. of	Prof. (Dr.) S. R.	Dhore - Department	
Computer En	ngine	eering, AIT Pune	Army Institute of Dighi Hill's,Pune	Technology 15.	Page 61 of 63

Hands-on Assignments				
Group-A Assignments				
1.	Translate the Preamble of The Constitution of India in any Indian language.			
2.	Visit: https://secure.mygov.in/read-the-preamble-india Read the Preamble of The Constitution of India Get the online GOI Certificate Inform, Motivate, help your friends and relatives for getting certificate Email copy of certificate to: HOD and Faculty in-charge			
3.	Download the copy of The Constitution of India from Union Govt. web site. <u>https://legislative.gov.in/constitution-of-india</u> Read titles of articles, Prepare Hand-written or Softcopy of only titles of all articles and Schedules. Find which article is repeated in which parts of our Constitution. Read and translate this article in any Indian language			
Group B Assignments (Any one)				
1.	Prepare Street play script and perform Street play for enlightenment on the subjects related to The Constitution of India (Minimum. 5 Min., Max. 15 Min.) [Team work]			
2.	Making movie for enlightenment on the subjects related to The Constitution of India (Minimum. 5 Min., Max. 15 Min.) [Team work]			
3.	Prepare and deliver written speech on The Constitution of India (Minimum. 5 Min., Max. 15 Min.)			
	Group C Assignments (Optional Extra Co-curricular)			
Create/Join AIT_FE Constitution Club2025 WhatsApp group of your class Create/Join AIT_FE Constitution Club2025 Facebook/twitter/social media group/page of your class Regularly read/write posts about COI				
Learning Resources				
Refer 1. 2. 3. 4. 5. 6. 7.	ence/Text Books/ Web References: The Constitution of India Gov. of India Basu, D. D. "Introduction to the Constitution of India" Prentice Hall of India. Debate and discussion in Constituent assembly, Different volumes (GOI) Sudhir Krishnaswamy "Democracy and Constitutionalism in India" Oxford University Press Fali S. Nariman "You Must Know Your Constitution" Sustainable development goals UNO www.constitutionofindia.net			

8. MOOC courses available on the subject, recommended by Board of studies.

Task Force at Curriculum Design

1. Recommended Members for BoS from Outside Organisation-

Sr.	Member Name	Designation	Organisation
No.			
1.	Dr Sarang Joshi	Professor in Computer Engg.	Pune Institute of Computer
			Technology, Pune
2.	Dr. Pramod Patil	Professor and	DY Patil Institute of Technology
		Dean Science and engineering,	
		SPPU	
3.	Dr. Prashant Yawalkar	Professor in Computer	MET Bhujbal College of
		Engineering	engineering Nashik.
4.	Dr Ganesh Pathak	Professor in Computer	MIT ADT University, Pune
		Engineering	
5.	Dr. Vinod Pachghare	Professor in Computer	College of Engineering
	_	Engineering	technological university, Pune
6.	Dr. Prashant Kumbharkar	Professor in Computer	Rajshree Shahu College of
		Engineering	engineering, Pune

2. Team Leader-

Sr. No.	Member Name	Designation
1.	Dr. SR Dhore	HOD Computer & Professor
2.	Prof. PR Sonawane	Assistant Professor
3.	Prof. KA Hule	Assistant Professor

3. Teams, Course Design-

Sr.	Course	Presiding Offr	Faculty Member
1 1	SEM1. Engineering Mathematics I	Dr. Ganesh Mundhe	Mr. PR Sonawane
1.	(Linear Algebra & Univariate Calculus)	Di. Ganesii Munune	WII. I K Soliawalie
	SEMII: Engineering Mathematics II		
	(Linear Algebra & Statistics)		
2.	SEMI: Applied Sciences for Computer	Ms. Mrudula Chandola	Dr. Nikita Singhal
	Engineering –I (Physics)		C
	SEMII: Applied Sciences for Computer		
	Engineering –II (Biochemistry)		
3.	Basic Mechanical Engineering & CAD	Dr. UV Awasarmol	Ms. SA Shirke
4.	SEMII: Basic Electrical & Electronics	Dr. PB Karandikar	Mr. MB Lonare
	Engineering		
5.	SEMI: Problem Solving Techniques	Dr. SR Dhore	Mr. PR Sonawane
	SEMII: Foundation of Object-Oriented	Dr. Ashwini Sapkal	Mr. KA Hule
	Programming		
6.	SEMI: Design Thinking & Ideation	Dr. Swati Kulkarni	Mr. AP Kadam
	SEMII: Design Thinking, Innovation &		
	Prototyping		
7.	SEMI: Communication Skills & Human Values	Ms. Nithya Bhaskar	Dr. VY Ganganwar
8.	SEMII: Entrepreneurship skills & Professional	Dr. SD Oza	-
	Ethics		
9.	SEMI: Indian Knowledge System	Ms. Anita Suryawanshi	Ms. RS Patil
10.	SEMI: Environmental Science (AC)	Dr. Swati Kulkarni	Ms. YT Hambir
11.	SEMII: Life Skills/Liberal Learning (CC)	Dr. Swati Kulkarni	Mr. MM Hajare
12.	SEMII: Constitute of India (AC)	Mr. PR Sonawane	Mr. PR Sonawane

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Prof. (Dr.) S. R. Dhore Head of Computer Department Army Institute of Technology Dighi Hill's,Pune - 15.

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