MIT ACADEMY OF ENGINEERING, ALANDI

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

MIT ACADEMY OF ENGINEERING, ALANDI

Curriculum for

Under Graduate Program

Bachelor of Technology in

Computer Science Engineering (AIML)

(Choice Based Credit System)

NEP REVISION 2023 (2.0)

(Four Year Curriculum W.E.F, AY: 2024-2025)

BoS Chairman Computer Engineering	Member Secretary Academic Council Dean Academics	Chairman Academic Council Director MITAOE

INSTITUTE VISION

To be a new age learning center for holistic development of students into professional engineers, to cater to the changing needs of techno-society.

INSTITUTE MISSION

- To provide new-age infrastructural facilities blended with skill-based curriculum and activity-based pedagogical approaches to develop competitive engineering professionals to solve real-world problems.
- To prepare students for lifelong learning by transforming educational practices.
- To promote ethical and moral values by involving students in community services.
- To promote entrepreneurship and managerial skills by strengthening industry-institute interaction.

SCHOOL OF COMPUTER ENGINEERING

VISION

To excel as a learning center in the field of Computer Engineering for transforming learners into future technocrats, leaders, and entrepreneurs with moral and ethical values.

MISSION

- To provide state of art infrastructure facilities to produce competitive engineering professionals.
- To promote entrepreneurship and managerial skills by strengthening industry-institute interaction.
- To prepare students for lifelong learning by transforming educational practices.

PROGRAM EDUCATIONAL OBJECTIVES(PEO's)

PEO	PROGRAM EDUCATIONAL OBJECTIVES(PEO's)
PEO 1	Computer engineering graduates will be successful, skillful, well-groomed, and efficient professionals in the computer field with fundamental knowledge of computer engineering, by making valuable technical contributions to the design, development, deployment, and production of computing systems and related allied areas.
PEO 2	Graduates will be able to solve techno-socio-economic problems by providing automated solutions in various fields like finance, industry, agriculture, and medical by utilizing and exhibiting social, communication, and ethical values.
PEO 3	Graduates will be capable of applying the knowledge of the latest technologies, utilities, and simulation tools, to provide solutions to different domains by identifying, formulating, and analyzing their problems.

PROGRAM OUTCOMES (PO's)

PO	PROGRAM OUTCOMES (POs)
PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
PO4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES(PSO's)

PSO	PROGRAM SPECIFIC OUTCOMES (PSO's)
PSO1	**Logic building:** Participate in planning,implementing and evaluating language specific team programming solutions to specific applications in system programming, networking and databases and machine intelligence.
PSO2	**Application development skill:** complete individual practical experiences in a variety of programming languages and situations for solving real life problems.
PSO3	**Competency Development:** Develop IT competencies using knowledge, skills and disposition to prepare for a global workplace.

MIT Academy of Engineering, Alandi, Pune
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COMMON CURRICULUM FRAMEWORK (NEP Revision 2023 (2.0))

The Bachelor of Technology Program shall be based on the following type of courses.

	COURSE AND CREDIT DISTRIBUTION: SEMESTER-WISE											
S.N.	**TYPE OF COURSE**	**NO. OF COURSES/SEMESTER (CREDITS)**								**Total Courses**	**Total Credits**	**%**
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**			
1.	Basic Science Courses (BSC)	2(7)	2(8)							4	15	9
2.	Engineering Science (ESC)	3(8)	2(6)							5	14	9
3.	Program Core Course (PCC)		1(2)	3(10)	3(10)	2(8)	2(8)	1(4)	1(4)	13	46	27
4.	Program Elective Course (PEC)					1(4)	1(4)	1(4)	1(3)	5	15	9
5	Vocational and Skill Enhancement Course (VSEC)	1(2)	1(2)	1(2)	1(2)	1(2)	1(2)	1(2)		6	12	7
6	Multi-Disciplinary Minor(MDM)				1(3)	1(3)	1(3)	1(2)	1(3)	5	14	8
7	Open Elective (OE)			1(2)	1(4)				1(2)	3	8	5
8	Ability Enhancement Courses (HSSM AEC)	1(2)					1(2)			2	4	2
9	Management/Entrepreneurship/Economics Courses (HSSM MEC)			1(2)				1(2)		2	4	2
10	Indian Knowledge System (HSSM IKS) & Co-curricular (CC)	2(3)	1(2)							3	5	3
11	Value Education Course (HSSM VEC)			1(3)	1(2)					2	5	3
12	Experiential Learning/ Project/ Field Work/Community (ELC PRJ)			1(1)	1(1)	1(2)	1(2)	0/2 (4)	0/2 (4)	6	10	6
13	Experiential Learning Summer/ Semester Long Internship (ELC SI)			1(2)		1(2)		1(4)	1(8)	4	16	10
	Audit Courses	1			1					2	0	0
	TOTAL	8 (21)	8 (21)	9 (22)	9 (22)	7 (21)	7 (21)	7 (20)	5 20)	62	168	100

	CREDITS (CONTACT HOURS)						
	1 Lecture Hour = 1 Credit, 2 Lab Hours = 1 Credit, 1 Tutorial Hour = 1 Credit						
SL. NO.	YEAR	SEMESTER CREDIT			SEMESTER CONTACT HOURS		
		1	2	TOTAL	1	2	TOTAL
1.	First Year	21	21	42	27	29	56
2.	Second Year	22	22	44	31	30	61
3.	Third Year	21	21	42	27	31	58
4.	Final Year	20	20	40	20	13	43
TOTAL				168			218

COURSE CATEGORIES ABBREVIATION	
BSC	Basic Science Course
ESC	Engineering Science Course
PCC	Programme Core Course
PEC	Programme Elective Course
MDM	Multi-Disciplinary Minor
OE	Open Elective
VSEC	Vocational and Skill Enhancement Course
HSSM AEC	Humanities Social Science Management Ability Enhancement Courses
HSSM MEC	Humanities Social Science Management/Entrepreneurship/ Economics Course
HSSM IKS	Humanities Social Science Management Indian Knowledge System
HSSM VEC	Humanities Social Science and Management Value Education Course
ELC PRJ	Experiential Learning Course Project/ Field Work/ Community Engagement Project
ELC SI	Experiential Learning Course Student's Internship (Summer/ Semester Long/ Year Long)
CC	Co-Curricular Courses

ABBREVIATIONS			
TH	Theory Lecture	CA	Continuous Assessment
P	Practical Lab	T/P	Term Work / Practical
TU	Tutorial	DM	Demonstration
IA	Internal Assessment	Lab	Laboratory
MSE	Mid Semester Exam		
ESE	End Semester Exam		

MIT ACADEMY OF ENGINEERING, ALANDI

Curriculum for

First Year

Bachelor of Technology

Computer Science Engineering (AIML)

NEP REVISION 2023 (2.0)

(With Effect from Academic Year: 2024-2025)

SCHOOL OF COMPUTER ENGINEERING (COMPUTER SCIENCE ENGINEERING(AIML))	W. E. F.	:	2024-2025
FIRST YEAR BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE ENGINEERING(AIML))	RELEASE DATE	:	01/08/2024
	REVISION NO.	:	2.0 (NEP)

SEMESTER: I COMPUTER SCIENCE ENGINEERING (AIML)

2301186 - Universal Human Values (Induction Program)

	COURSE		TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						
			Hour/Week			THEORY			PRACT/TUT		TOTAL	CREDIT
TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P		
BSC	2301101T	Calculus and Differential Equations	3	-	1	30	20	50	20	30	150	4
BSC	2301104T	Science of Nature	3	-	-	30	20	50	-	-	100	3
	2301104L	Science of Nature Lab	-	2	-	-	-	-	20	30	50	1
ESC	2304101T	Foundations of Computing	2	-	-	15	20	40	-	-	75	2
	2304101L	Foundations of Computing Lab	-	2	-	-	-	-	20	30	50	1
ESC	2303101T	Applied Mechanics	2	-	-	15	20	40	-	-	75	2
	2303101L	Applied Mechanics Lab	-	2	-	-	-	-	20	30	50	1
ESC	2309101T	Design Thinking	1	-	-	15	-	20	-	-	35	1
	2309101L	Design Thinking Lab	-	2	-	-	-	-	20	20	40	1
VSEC	2312161T	Data Driven Modeling	1	-	-	15	-	20	-	-	35	1
	2312161L	Data Driven Modeling Lab	-	2	-	-	-	-	20	20	40	1
CC	2301182	Liberal Learning	-	2	-	-	-	-	-	50	50	1
HSSM IKS	2312181	Indian Knowledge System (Vedic Mathematics)	2	-	-	25	-	50	-	-	75	2
TOTAL			**14**	**12**	**1**						**825**	**21**

SCHOOL OF COMPUTER ENGINEERING (COMPUTER SCIENCE ENGINEERING(AIML))	W. E. F.	:	2024-2025
FIRST YEAR BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE ENGINEERING(AIML))	RELEASE DATE	:	01/08/2024
	REVISION NO.	:	2.0 (NEP)

SEMESTER: II COMPUTER SCIENCE ENGINEERING (AIML)												
COURSE			**TEACHING SCHEME**			**EXAMINATION SCHEME AND MARKS**						**CREDIT**
			Hour/Week			**THEORY**			**PRACT**		**TOTAL**	
TYPE	**CODE**	**NAME**	TH	P	TU	IA	MSE	ESE	CA	D/P		
BSC	2301103	Statistics and Integral Calculus	3	-	1	30	20	50	20	30	150	4
BSC	2301102T	Engineering Physics	2	-	-	15	20	40	-	-	75	2
	2301102L	Engineering Physics Lab	-	2	-	-	-	-	20	30	50	1
ESC	2307101T	Electrical and Electronics Engineering	2	-	-	15	20	40	-	-	75	2
	2307101L	Electrical and Electronics Engineering Lab	-	2	-	-	-	-	20	30	50	1
ESC	2303101T	Essentials of Data Science	2	-	-	15	20	40	-	-	75	2
	2303101L	Essentials of Data Science Lab	-	2	-	-	-	-	20	30	50	1
VSEC	2312162T	Data Visualization	1	-	-	15	-	20	-	-	35	1
	2312162L	Data Visualization Lab	-	2	-	-	-	-	20	20	40	1
PCC	2312111T	Discrete Structure	2	-	-	15	20	40	-	-	75	2
HMMS AEC	2301111/ 2/3/4	Communication Skills (English/German/Japanese/French)	-	4	-	-	-	-	35	40	75	2
CC	2307183	Creative Technologies	-	4	-	-	-	-	35	40	75	2
TOTAL			**12**	**16**	**1**						**825**	**21**

*Two Credit Internships need to be completed after Completion of the First Year.

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MIT ACADEMY OF ENGINEERING, ALANDI

Curriculum for

Second Year

Bachelor of Technology

Computer Science Engineering (AIML)

NEP REVISION 2023 (2.0)

(With Effect from Academic Year: 2025-2026)

SEMESTER: III (COMPUTER SCIENCE ENGINEERING (AIML))

TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P	TOTAL	CREDIT
PCC	23XX21XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX21XL	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PCC	23XX21XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX21XL	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PCC	23XX21XT	Program Core Course	2	-	-	15	20	40	-	-	75	2
VSEC	2304261	Problem Solving Using OOP(C++)	-	4	-	-	-	-	35	40	75	2
	2304262	Problem-Solving Using OOP(Java)										
	23XX264/5L	Discipline Skill Dev. Course										
HSSM MEC	2301276	Entrepreneurship Skills	2	-	-	35	-	40	-	-	75	2
HSSM VEC	2301287	Universal Human Values-II	1	4	-	-	-	25	-	75	100	3
OE	2311251	Prototyping	-	4	-	-	-	-	35	40	75	2
	23XX25X	Open Elective	2	-	-	35	-	40	-	-		
ELC PRJ	23XX291	Project Design	-	2	-	-	-	-	20	30	50	1
ELC SI	23XX296	Internship (Life And Soft Skills)	-	-	-	-	-	-	-	75	75	2
TOTAL			13	18							825	22

SEMESTER: IV (COMPUTER SCIENCE ENGINEERING (AIML))

TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P	TOTAL	CREDIT
PCC	23XX21XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX21XL	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PCC	23XX21XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX21XL	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PCC	23XX21XT	Program Core Course	2	-	-	15	20	40	-	-	75	2
VSEC	23XX26XL	Discipline Skill Develop. Course	-	4	-	-	-	-	35	40	75	2
	2304266L	Data Structures										
MDM	*MDM List	MDM Course-I	2	-	-	15	20	40	-	-	75	2
	*MDM List	MDM Course-I Lab	-	2	-	-	-	-	20	30	50	1
OE	23XX25XT	Open Elective (Applied Maths)	3	-	-	30	20	50	-	-	100	3
	23XX25XL	Open Elective Course Lab	-	2	-	-	-	-	20	30	50	1
HSSM VEC	2301286	Environmental Science	2	-	-	35	-	40	-	-	75	2
ELC PRJ	23XX292	Project Implementation	-	2	-	-	-	-	20	30	50	1
Audit	2301281	Indian Constitution	1	-	-	-	-	-	-	-	Audit	
TOTAL			16	14	-						850	22

*Two Credit Internships need to be completed after Completion of the Second Year.

MIT ACADEMY OF ENGINEERING, ALANDI

Curriculum for

Third Year

Bachelor of Technology

Computer Science Engineering (AIML)

NEP REVISION 2023 (2.0)

(With Effect from Academic Year: 2026-2027)

SEMESTER: V (COMPUTER SCIENCE ENGINEERING (AIML))

TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P	TOTAL	CREDIT
PCC	23XX31XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX31XT	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PCC	23XX31XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX31XT	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PEC	23XX32XT	Program Elective Courses	3	-	-	30	20	50	-	-	100	3
	23XX32XL	Program Elective Courses Lab	-	2	-	-	-	-	20	30	50	1
VSEC	23XX36XL	Skill Courses	-	4	-	-	-	-	35	40	75	2
MDM	*MDM List	MDM Course-II	2	-	-	15	20	40	-	-	75	2
	*MDM List	MDM Course-II Lab	-	2	-	-	-	-	20	30	50	1
ELC PRJ	23XX391	Major Project - I	-	4	-	-	-	-	35	40	75	2
ELC SI	23XX396	Internship (Technical)	-	-	-	-	-	-	-	75	75	2
TOTAL			11	16	-						800	21

Header groups: TEACHING SCHEME (Hour/Week): TH, P, TU. EXAMINATION SCHEME AND MARKS — THEORY: IA, MSE, ESE; PRACT: CA, D/P; TOTAL; CREDIT.

SEMESTER: VI (COMPUTER SCIENCE ENGINEERING (AIML))

TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P	TOTAL	CREDIT
PCC	23XX31XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX31XL	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PCC	23XX31XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX31XL	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PEC	23XX31XT	Program Elective Course	3	-	-	30	20	50	-	-	100	3
	23XX31XL	Program Elective Course Lab	-	2	-	-	-	-	20	30	50	1
VSEC	23XX36XL	Skill Course	-	4	-	-	-	-	35	40	75	2
MDM	*MDM List	MDM Course-III	2	-	-	15	20	40	-	-	75	2
	*MDM List	MDM Course-III Lab	-	2	-	-	-	-	20	30	50	1
HSSM AEC	23XX371	Employability and Career Development	-	4	-	-	-	-	35	40	75	2
ELC PRJ	23XX392	Major Project - II	-	4	-	-	-	-	35	40	75	2
TOTAL			11	20	-						800	21

*Four Credit Internship needs to be completed after Completion of the Third Year

MIT ACADEMY OF ENGINEERING, ALANDI

Curriculum for

Final Year

Bachelor of Technology

Computer Science Engineering (AIML)

NEP REVISION 2023 (2.0)

(With Effect from Academic Year: 2026-2027)

COURSE STRUCTURE (NEP REVISION 2023)		
SCHOOL OF COMPUTER ENGINEERING (COMPUTER SCIENCE ENGINEERING(AIML))	**W. E. F.** :	**2027-2028**
FINAL YEAR BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE ENGINEERING(AIML))	**RELEASE DATE** :	**01/08/2027**
	REVISION NO. :	**2.0 (NEP)**

SEMESTER: VII COMPUTER SCIENCE ENGINEERING (AIML) (PART A)

TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P	TOTAL	CREDIT
PCC	23XX41XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX41XL	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PEC	23XX42XT	Program Elective Course	3	-	-	30	20	50	-	-	100	3
	23XX42XT	Program Elective Course Lab	-	2	-	-	-	-	20	30	50	1
MDM	*MDM List	MDM Course-IV	2	-	-	15	20	40	-	-	75	2
HSSM MEC	23XX476	Project Management /----------	2	-	-	15	20	40	-	-	75	2
ELC PRJ	23XX491	Major Project - III	-	4	-	-	-	-	35	40	75	2
ELC PRJ	23XX492	Research Methodology	2	-	-	15	20	40	-	-	75	2
ELC SI	23XX496	Summer Internship (Technical)	-	-	-	-	-	-	-	150	150	4
TOTAL			**12**	**8**	**-**						**750**	**20**

SEMESTER: VIII COMPUTER SCIENCE ENGINEERING (AIML)(PART A)

TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P	TOTAL	CREDIT
PCC	23XX41XT	Program Core Course	3	-	-	30	20	50	-	-	100	3
	23XX41XL	Program Core Course Lab	-	2	-	-	-	-	20	30	50	1
PEC	23XX42XT	Program Elective Course	3	-	-	30	20	50	-	-	100	3
	23XXSWXX	Swayam Course	-	-	-	25		75	-	-		
MDM	*MDM List	MDM Course-V	3	-	-	30	20	50	-	-	100	3
	23XXSWXX	Swayam Course	-	-	-	25		75	-	-		
OE	23XX451	Professional Certification Course	2	-	-	-	-	-	35	40	75	2
ELC SI	23XX497	Semester Long Internship/ Exchange/ Capstone Project	-	-	-	-	-	-	-	-	300	8
TOTAL			**11**	**2**							**725**	**20**

SCHOOL OF COMPUTER ENGINEERING (COMPUTER SCIENCE ENGINEERING(AIML))	W. E. F.	:	2027-2028
FINAL YEAR BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE ENGINEERING(AIML))	RELEASE DATE	:	01/08/2027
	REVISION NO.	:	2.0 (NEP)

SEMESTER: VII COMPUTER SCIENCE ENGINEERING (AIML) (PART B)

	COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
				Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME		TH	P	TU	IA	MSE	ESE	CA	D/P		
PCC	23XX41XT	Program Core Course		3	-	-	30	20	50	-	-	100	3
	23XX41XL	Program Core Course Lab		-	2	-	-	-	-	20	30	50	1
PEC	23XX42XT	Program Elective Course		3	-	-	30	20	50	-	-	100	3
	23XX42XT	Program Elective Course Lab		-	2	-	-	-	-	20	30	50	1
MDM	*MDM List	MDM Course-IV		2	-	-	15	20	40	-	-	75	2
ELC PRJ	23XX491	Project - III		-	4	-	-	-	-	35	40	75	2
ELC SI	23XX497	Semester Long Internship/ Exchange/ Capstone Project		-	-	-	-	-	-	-	-	300	8
	TOTAL			**8**	**8**	**-**						**750**	**20**

SEMESTER: VIII COMPUTER SCIENCE ENGINEERING (AIML)(PART B)

	COURSE			TEACHING SCHEME			EXAMINATION SCHEME AND MARKS						CREDIT
				Hour/Week			THEORY			PRACT		TOTAL	
TYPE	CODE	NAME		TH	P	TU	IA	MSE	ESE	CA	D/P		
PCC	23XX41XT	Program Core Course		3	-	-	30	20	50	-	-	100	3
	23XX41XL	Program Core Course Lab		-	2	-	-	-	-	20	30	50	1
PEC	23XX42XT	Program Elective Course		3	-	-	30	20	50	-	-	100	3
	23XXSWXX	Swayam Course		-	-	-	25		75	-	-		
MDM	*MDM List	MDM-V		3	-	-	30	20	50	-	-	100	3
	23XXSWXX	Swayam Course		-	-	-	25		75	-	-		
HSSM MEC	23XX476	Project Management /-----------		2	-	-	15	20	40	-	-	75	2
OE	23XX451	Professional Certification Course		2	-	-	-	-	-	35	40	75	2
ELC PRJ	23XX492	Research Methodology		2	-	-	15	20	40	-	-	75	2
ELC SI	23XX496	Summer Internship (Technical)		-	-	-	-	-	-	-	150	150	4
	TOTAL			**15**	**2**							**725**	**20**

Program	Exit after	Courses	Credits	Total
Computer Science Engineering (AIML)	First Year	Internship	4	8
		Database Management System	4	
	Second Year	Internship	4	8
		Software Engineering	4	
	Third Year	Internship	4	8
		Software Testing & Quality Assurance/ Human-Computer Interaction	4	

Basic Science Courses (BSC): 4 Courses and 15 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	2301101T	Calculus and Differential Equations	4
2.	2301102T	Engineering Physics	2
	2301102L	Engineering Physics Lab	1
3.	2301103T	Statistics and Integral Calculus	3
	2301103T	Statistics and Integral Calculus Lab	1
4.	2301104T	Science of Nature	3
	2301104L	Science of Nature Lab	1

Engineering Science (ESC):5 Courses and 14 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	2307101T	Electrical and Electronics Engineering	2
	2307101L	Electrical and Electronics Engineering Lab	1
2.	2304101T	Foundations of Computing	2
	2304101L	Foundations of Computing Lab	1
3.	2304102T	Essentials of Data Science	2
	2304102L	Essentials of Data Science Lab	1
4.	2303101T	Applied Mechanics	2
	2303101L	Applied Mechanics Lab	1
5.	2309101T	Design Thinking	1
	2309101L	Design Thinking Lab	1

Program Core Course (PCC): 13 Courses and 46 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	23XX111T	Program Core Course	2
2.	23XX21xT	Program Core Course	3
	23XX21xL	Program Core Course Lab	1
3.	23XX21xT	Program Core Course	3
	23XX21xL	Program Core Course Lab	1
4.	23XX21xT	Program Core Course	2
5.	23XX21xT	Program Core Course	3
	23XX21xL	Program Core Course Lab	1
6.	23XX21xT	Program Core Course	3
	23XX21xL	Program Core Course Lab	1
7.	23XX21xT	Program Core Course	2
8.	23XX31xT	Program Core Course	3
	23XX31xL	Program Core Course Lab	1
9.	23XX31xT	Program Core Course	3
	23XX31xL	Program Core Course Lab	1
10.	23XX31XT	Program Core Course	3
	23XX31xL	Program Core Course Lab	1
11.	23XX31XT	Program Core Course	3
	23XX31xL	Program Core Course Lab	1
12.	23XX41XT	Program Core Course	3
	23XX41XL	Program Core Course Lab	1
13.	23XX41XT	Program Core Course Lab	3

Program Elective Course (PEC): 4 Courses and 15 Credits			
Sl. No.	Course Code	Course Name	Course Credits
1.	23XX32XT	Program Elective Course	3
	23XX32XT	Program Elective Course Lab	1
2.	23XX32XT	Program Elective Course	3
	23XX32XT	Program Elective Course Lab	1
3.	23XX42XT	Program Elective Course	3
	23XX42XT	Program Elective Course Lab	1
4.	23XXSWXX	SWAYAM Course	3

List of SWAYAM Courses			
Sl. No.	Course Code	Course Name	Course Credits
1.	23XXSW01	SWAYAM Course	3
2	23XXSW02	SWAYAM Course	
3.	23XXSW03	SWAYAM Course	
4.	23XXSW04	SWAYAM Course	
5.	23XXSW05	SWAYAM Course	
6.	23XXSW06	SWAYAM Course	

**Vocational and Skill Enhancement Course (VSEC): 6 Courses and 12 Credits**			
Sl. No.	**Course Code**	**Course Name**	**Course Credits**
1.	23XX161L	Vocational and Skill Enhancement Course	2
2.	23XX162L	Vocational and Skill Enhancement Course	2
3.	2304261L	Problem-Solving Using OOP (C++)	2
	2304262L	Problem-Solving Using OOP (Java)	
	23XX26XL	Discipline Skill Dev. Course	
4.	2304266L	Data Structures	2
	23XX26XL	Discipline Skill Develop. Course	
5.	23XX36XL	Vocational and Skill Enhancement Course	2
	23XX36XL	Professional Certification Course	
	23XX36XL	Vocational and Skill Enhancement Course	
	23XX36XL	Professional Certification Course	
6.	23XX36XL	Vocational and Skill Enhancement Course	2
	23XX36XL	Professional Certification Course	
	23XX36XL	Vocational and Skill Enhancement Course	
	23XX36XL	Professional Certification Course	

**List of Vocational Skill Enhancement Course (VSEC): 6 Courses and 12 Credit**						
Program me Name	**VSEC Course 1**	**VSEC Course 2**	**VSEC Course 3**	**VSEC Course 4**	**VSEC Course 5**	**VSEC Course 6**
Computer Science Engineeri ng (AIML)	Data Driven Modeling	Data Visualization	Problem Solving Using OOP (C++) / (Java)	Core Java/ Advance Java	Linux Administration-I / Web Technology/ Mobile App Development / UI/UX Design	Linux Administration-II Cloud Services /Web and Desktop Application Development

			Open Elective (OE): 3 Courses and 8 Credits	
Sl. No.	Offering School	Course Code	Course Name	Course Credits
1.	SHES (Mathematics)	2301251T	Applied Mathematics	3
		230121L	Applied Mathematics Lab	1
2.	SHES (Physics)	2301252T	Foundation of Quantum Computing	3
		2301252L	Foundation of Quantum Computing Lab	1
3.	B. Design	2311251T	Prototyping	2
4.	Civil Engineering	2303251T	Corporate Valuation	3
		2303251L	Corporate Valuation Lab	1
		2303252T	Banking and Financial Services	2
		2303451T	Siemens(Product Life Cycle Management)	2
5.	Computer Engineering	2304251T	Business Management and Information System	3
		2304251L	Business Management and Information System Lab	1
		2304252T	Economics	2
		2304451T	Professional Certification	2
6.	Computer Engineering (Software Engineering)	2310251T	Business Management and Information System	3
		2310251L	Business Management and Information System Lab	1
		2310252T	Economics	2
		2310451T	Professional Certification	2
7.	Chemical Engineering	2305251T	Applied Numerical Methods	3
		2305251L	Applied Numerical Methods Lab	1
		2305252T	Financial Planning & Management	2
		2305451T	Professional Certification	2
8.	Electronics Engineering	2306251T	Engineering Informatics (For B.Des)	3
		2306251L	Engineering Informatics (For B.Des) Lab	1
		2306252T	Introduction to IoT (BDes)	2
		2306451T	CISCO Networking	2
9.	Electronics & Telecommunication Engineering	2307251T	Engineering Informatics (For B.Des)	3
		2307251L	Engineering Informatics (For B.Des) Lab	1
		2307252T	Introduction to IoT (BDes)	2
		2307451T	CISCO Networking	2
10.	Mechanical Engineering	230925T	Corporate Valuation	3
		2309251L	Corporate Valuation Lab	1
		2309252T	Banking and Financial Services	2
		2309451T	Siemens(Product Life Cycle Management)	2

**Humanities Social Science and Management Ability Enhancement Courses (HSS AEC): 2 Courses and 4 Credits**
Sl. No.	Course Code	Course Name	Course Credits
1.	2301171/2/3/4	Communication Skills (English/ German/Japanese/French)	2
2.	23XX371	Employability and Career Development	2

**Humanities Social Science Management/Entrepreneurship/Economics(HSS MEC): 2 Courses and 4 Credits**
Sl. No.	Course Code	Course Name	Course Credits
1.	2301276	Entrepreneurship Skills	2
2.	23XX476	Project Management / ---------------	2

**Humanities Social Science and Management Value Education Course (HSSM VEC): 3 Courses and 5 Credits**
Sl. No.	Course Code	Course Name	Course Credits
1.	2301186	Universal Human Values-I	Audit
2.	2301286	Environmental Science	2
3.	2301287	Universal Human Values-II	3

**Humanities Social Science and Management Indian Knowledge System / Co-Curricular Courses (HSSM IKS / CC): 4 Courses and 5 Credits**
Sl. No.	Course Code	Course Name	Course Credits
1.	23XX181	Indian Knowledge System (Ancient Indian Architecture and Town Planning)	2
	2305181	Indian Knowledge System - (Indian Heritage Textiles)	
	2304181	Indian Knowledge System - (Vedic Mathematics)	
	2310181	Indian Knowledge System - (Vedic Mathematics)	
2.	2301182	Liberal Learning - (HSSM CC)	1
3.	2307183	Creative Technologies - (HSSM CC)	2
4.	2301281	Indian Constitution	Audit

**Experiential Learning Course Project/Field Work/Community Project(ELC PRJ): 6 Courses and 10 Credit**
Sl. No.	Course Code	Course Name	Course Credits
1.	23XX291	Project Design	1
2.	23XX292	Project Implementation	1
3.	23XX391	Major Project - I	2
4.	23XX392	Major Project - II	2
5.	23XX491	Major Project - III	2
6.	23XX492	Research Methodologies	2

**Experiential Learning Course Student's Internship (Summer/Semester Long) (ELC SI): 4 Courses and 16 Credits**
Sl. No.	Course Code	Course Name	Course Credits
1.	23XX296	Internship (Life And Soft Skills)	2
2.	23XX396	Summer Internship (Technical)	2
3.	23XX496	Summer Internship (Technical)	4
4.	23XX497	Semester Long Internship/ Capstone Project/ Student Exchange	8

Multi-Disciplinary Minor (MDM) List: 05 Courses and 14 Credits											
Programme Name	Open Track Name	Semester IV (MDM-I)		Semester V (MDM-II)		Semester VI (MDM-III)		Semester VII (MDM-IV)		Semester VIII (MDM-V)	
		Course Code	Course Name	Course Code	Course Name	Course Code	Course Name	Course Code	Course Name	Course Code	Course Name
Chemical	Green Sustainability	2305231 (T+L)	Sustainability Informatics	2305331 (T+L)	Environmental Engineering (T+L)	2305332 (T+L)	Sustainable Engineering and Life Cycle Assessment (T+L)	2305431	Green technology	23XXSWXX	SWAYAM Course
Civil Engineering	Infrastructure and Sustainability	2303231 (T+L)	Material Engineering	2303331 (T+L)	Smart Cities (T+L)	2303332 (T+L)	Sustainable Engineering (T+L)	2303431 (T+L)	Environmental Planning & Impact Assessment	23XXSWXX	SWAYAM Course
Computer Engineering	Artificial Intelligence and Data Science	2304231	Engineering Informatics	2304331 (T+L)	Data Analytics (T+L)	2304332 (T+L)	Artificial Intelligence & Machine Learning (T+L)	2304431 (T+L)	Deep Learning	23XXSWXX	SWAYAM Course
Computer Engineering (Software Engineering)	Cloud Computing	2310231	Engineering Informatics	2310331 (T+L)	Cloud Computing Foundations (T+L)	2310332 (T+L)	Cloud-Native Application Development (T+L)	2310431 (T+L)	Cloud Native DevOps	23XXSWXX	SWAYAM Course
CSE (AIML)											
CSE (DS)											
CSE (IT)											

		Multi-Disciplinary Minor (MDM): 05 Courses and 14 Credits									
		Semester IV (MDM-I)		Semester V (MDM-II)		Semester VI (MDM-III)		Semester VII (MDM-IV)		Semester VIII (MDM-V)	
Programme Name	Track Name	Course Code	Course Name	Course Code	Course Name	Course Code	Course Name	Course Code	Course Name	Course Code	Course Name
Electronics Engineering	Semiconductor Technologies	2306231 (T+L)	Engineering Informatics (T+L)	2306331 (T+L)	Electronics System Design (T+L)	2306332 (T+L)	VLSI Design (T+L)	2306431 (T+L)	ASIC Design	23XXSW XX	SWAYAM Course System on Chip
Electronics & Tele-communication	Semiconductor Technologies	2307231 (T+L)	Engineering Informatics (T+L)	2307331 (T+L)	Electronics System Design (T+L)	2307332 (T+L)	VLSI Design (T+L)	2307431 (T+L)	ASIC Design	23XXSW XX	SWAYAM Course System on Chip
Mechanical Engineering	Computer Aided Engineering and Industrial Automation	2309231 (T+L)	Engineering Informatics (T+L)	2309331 (T+L)	CAD Automation and Customisation (T+L)	2309332 (T+L)	Computer Aided Simulation (T+L)	2309431 (T+L)	Industrial Automation	23XXSW XX	SWAYAM Course
	Robotics and Automation	2309231 (T+L)	Engineering Informatics (T+L)	2309333 (T+L)	Robot Fundamental & Kinematics (T+L)	2309334 (T+L)	Robot Dynamics and Control (T+L)	2309432 (T+L)	AI in Robotics	23XXSW XX	SWAYAM Course
MITACSC	Business Administration	23XX231 (T+L)	Principles and Practices of Management	23XX331	Organizational Behavior	23XX332	Production and Operation Management	23XX431	Micro and Macro Economics	23XXSW XX	SWAYAM Course
Entrepreneurship Cell	Innovation and Entrepreneurship	23XX231 (T+L)	Engineering Informatics (T+L)	23XX331	Foundational Course in Entrepreneurship	23XX332	Advanced Course in Entrepreneurship	23XX431	Startup and Incubation	23XXSW XX	SWAYAM Course
B. Design	Design for Engineers	2311231 (T+L)	Principles of Design	2311331 (T+L)	Packaging Design	2311332 (T+L)	Introduction to UI-UX	231133 (T+L)	Mini Design Project	23XXSW XX	SWAYAM Course

MIT ACADEMY OF ENGINEERING, ALANDI

Curriculum for

First Year

Bachelor of Technology

(Civil/Chem/Comp/Soft/Electronics/ENTC/Mech Engineering)

NEP REVISION 2023 (2.0)

(With Effect from Academic Year: 2023-2024)

MIT Academy of Engineering (An Autonomous Institute Affiliated to Savitribai Phule Pune University)	COURSE STRUCTURE (NEP REVISION 2023)		
SCHOOL OF ELECTRONICS, ENTC, MECHANICAL AND ENGINEERING	W.E.F	:	2023-2024
FIRST YEAR BACHELOR OF TECHNOLOGY (CIVIL/CHEM/COMP/SOFT/ELECTRONICS/ENTC/MECH ENGINEERING)	RELEASE DATE	:	01/08/2023
	REVISION NO.	:	2.0 (NEP)

SEMESTER: I (ELECTRONICS, ENTC, MECHANICAL)

Universal Human Values (Induction Program)

TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P	TOTAL	CREDIT
BSC	2301101T	Calculus and Differential Equations	3	-	1	30	20	50	-	-	100	3
	2301101U	Calculus and Differential Equations Tutorial	-	-	1	-	-	-	20	30	50	1
BSC	2301104T	Science of Nature	3	-	-	30	20	50	-	-	100	3
	2301104L	Science of Nature Lab	-	2	-	-	-	-	20	30	50	1
ESC	2304101T	Foundations of Computing	2	-	-	15	20	40	-	-	75	2
	2304101L	Foundations of Computing Lab	-	2	-	-	-	-	20	30	50	1
ESC	2303101T	Applied Mechanics	2	-	-	15	20	40	-	-	75	2
	2303101L	Applied Mechanics Lab	-	2	-	-	-	-	20	30	50	1
ESC	2309101T	Design Thinking	1	-	-	15	-	20	-	-	35	1
	2309101L	Design Thinking Lab	-	2	-	-	-	-	20	20	40	1
VSEC	2306161T	Electronics Workshop	1	-	-	15	-	20	-	-	35	1
	2306161L	Electronics Workshop Lab	-	2	-	-	-	-	20	20	40	1
	2307161T	Electronics Workshop	1	-	-	15	-	20	-	-	35	1
	2307161L	Electronics Workshop Lab	-	2	-	-	-	-	20	20	40	1
	2309161L	Computer Aided Engineering Drawing	-	4	-	-	-	-	35	40	75	2
CC	2301182L	Liberal Learning	-	2	-	-	-	-	-	50	50	1
HSSM IKS	2306181T	Indian Knowledge System (Vedic Mathematics)	2	-	-	25	-	50	-	-	75	2
	2307181T	Indian Knowledge System (Vedic Mathematics)			-	25	-	50	-	-		
	2309181T	Indian Knowledge System (Indian Metallurgy)			-	25	-	50	-	-		
TOTAL			**14**	**12(14)**	**1**						**825**	**21**

SCHOOL OF ELECTRONICS, ENTC, MECHANICAL AND ENGINEERING	W.E.F	:	2023-2024
FIRST YEAR BACHELOR OF TECHNOLOGY (CIVIL/CHEM/COMP/SOFT/ELECTRONICS/ENTC/MECH ENGINEERING)	RELEASE DATE	:	01/08/2023
	REVISION NO.	:	2.0 (NEP)

SEMESTER: II (ELECTRONICS, ENTC, MECHANICAL)

TYPE	CODE	NAME	TH	P	TU	IA	MSE	ESE	CA	D/P	TOTAL	CREDIT
BSC	2301103T	Statistics and Integral Calculus	3	-	1	30	20	50	-	-	100	3
	2301103U	Statistics and Integral Calculus Tutorial	-	-	1	-	-	-	20	30	50	1
BSC	2301102T	Engineering Physics	2	-	-	15	20	40	-	-	75	2
	2301102L	Engineering Physics Lab	-	2	-	-	-	-	20	30	50	1
ESC	2307101T	Electrical and Electronics Engineering	2	-	-	15	20	40	-	-	75	2
	2307101L	Electrical and Electronics Engineering Lab	-	2	-	-	-	-	20	30	50	1
ESC	2303101T	Essentials of Data Science	2	-	-	15	20	40	-	-	75	2
	2303101L	Essentials of Data Science Lab	-	2	-	-	-	-	20	30	50	1
VSEC	2306162T	Integrating Sensors and Actuators	1	-	-	15	-	20	-	-	35	1
	2306162L	Integrating Sensors and Actuators Lab	-	2	-	-	-	-	20	20	40	1
	2307162T	Integrating Sensors and Actuators	1	-	-	15	-	20	-	-	35	1
	2307162L	Integrating Sensors and Actuators Lab	-	2	-	-	-	-	20	20	40	1
	2309162L	Fab Lab	-	4	-	-	-	-	35	40	75	2
PCC	2306111T	Logic Sensing and Actuation	2	-	-	15	20	40	-	-	75	2
	2307111T	Logic Sensing and Actuation	2	-	-	15	20	40	-	-		
	2309111T	Manufacturing Processes	2	-	-	15	20	40	-	-		
HMMS AEC	2301111L	Communication Skills (English)	-	4	-	-	-	-	35	40	75	2
	2301112/3/4T	Communication Skills (German/Japanese/ French)	2	-	-	35	-	40	-	-	75	2
CC	2307183L	Creative Technologies	-	4	-	-	-	-	35	40	75	2
TOTAL			**12**	**16 (18)**	**1**						**825**	**21**

*Two Credit Internship need to accomplish after Completion of First Year

MIT | Academy of Engineering	COURSE SYLLABUS

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Calculus and Differential Equations
	COURSE CODE	2301101T
	COURSE CREDITS	3
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME	EXAMINATION SCHEME AND MARKS						
(HOURS/WEEK)	THEORY			LABORATORY		TOTAL	
LECTURE	TUTORIAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
3	NIL	30	20	50	NIL	NIL	100

PREREQUISITE : NIL

COURSE OBJECTIVES :

2301101T.CEO.1: To apply the concepts of partial differentiation.

2301101T.CEO.2: Demonstrate an understanding towards the applications of partial differentiation.

2301101T.CEO.3: Examine methods for solving first-order first-degree ordinary differential equations.

2301101T.CEO.4: Infer the applications of first-order differential equations.

2301101T.CEO.5: Determine the solution of linear differential equations of second and higher order.

2301101T.CEO.6: Solve first-order linear and nonlinear partial differential equations.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301101T.CO.1: Make use of properties of partial differentiation to solve the problems [L3].

2301101T.CO.2: Examine the applications of partial differentiation [L4].

2301101T.CO.3: Solve first-order and first-degree ordinary differential equations [L2].

2301101T.CO.4: Analyze real-world phenomenon governed by first-order ordinary differential equations [L4].

2301101T.CO.5: Apply concepts of solving linear differential equations of second and higher order governing different systems in engineering [L4].

2301101T.CO.6: Determine solutions of various partial differential equations by theoretical methods [L3].

COURSE ABSTRACT

The course focuses on developing important mathematical concepts in a comprehensible, coherent and rigorous way. This is achieved by means of a carefully balanced approach by including the topics of calculus and differential equations which will foster the analytical thinking, and problem solving abilities of the students. Students are encouraged to apply their mathematical knowledge to solve problems and clear their doubts through tutorial sessions. Students embarking on this course will be able to identify and solve various differential equation problrms and will be intellectually equipped with the links between these concepts and their core engineering and real life problems. This course will enable them to tackle the problems of differential equations that they encounter in other engineering courses.

THEORY COURSE CONTENTS

UNIT 1	Partial Differentiation	08 HOURS

Contents: Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables, Homogeneous functions, Euler's theorem, Differentiation of implicit functions.
Self Study: Differentiation of implicit functions.

UNIT 2	Applications Of Partial Differentiation	07 HOURS

Applications/Case Study: Maxima, Minima.
Contents: Jacobian, Jacobian of implicit functions, Partial derivative of an implicit function using Jacobians, Functional dependence, Maxima and Minima of functions of two variables.
Self Study: Jacobian of implicit functions.

UNIT 3	Ordinary Differential Equations Of First Order And First Degree	07 HOURS

Contents: Exact differential equations, Differential equations, Reducible to exact form-Integrating factors, Linear differential equations, Differential equations reducible to linear form.
Self Study: Differential equations reducible to linear form.

UNIT 4	Applications Of Ordinary Differential Equations Of First Order & First Degree	07 HOURS

Applications/Case Study: Electrical circuits.
Contents: Orthogonal trajectories, Newton's law of cooling, Growth & Decay, Electric circuits, Chemical applications- Mixing problems.
Self Study: Newton's law of cooling, Growth & Decay.

UNIT 5	Linear Differential Equation Of Second Order & Higher Order	08 HOURS

Applications/Case Study: Mass-Spring systems.
Contents: General solutions of linear differential equations with constant coefficients,Shortcut methods to find P.I., Method of variation of parameters, Equations reducible to linear differential equations with constant coefficients: Cauchy and Legendre's linear differential equations.
Self Study: Cauchy and Legendre's linear differential equations.
Further Readings: Simultaneous differnetial equations, Applications in Electric circuits, Mass-Spring systems etc.

UNIT 6	Partial Differential Equations	08 HOURS

Contents: Introduction and formation of a partial differential equation, solution of a partial differential equation, equations solvable by direct integration, Linear differential equations of the first order, Non-linear differential equations of the first order, Charpit's method.

Further Readings: Linear Homogeneous Partial Differential Equations.

TEXT BOOKS

1. Ramana, B. V. (2017). Higher Engineering Mathematics. Tata McGraw-Hill Education.
2. Grewal, B. S., & Grewal, J. S. (2018). Higher engineering mathematics. 2002, Khanna Publishers, New Delhi.

REFERENCE BOOKS

1. Thomas, G. B., Weir, M. D., Hass, J., & Giordano, F. R. (2002). Thomas' calculus (pp. 2379-8858). Addison-Wesley.
2. Kreyszig, E. (2015). Advanced Engineering Mathematics 10E All Access Pack. John Wiley & Sons.
3. Jain, R. K., & Iyengar, S. R. K. (2002). Advanced Engineering Mathematics, Narosa Pub.
4. O'Neil, P. V. (2012). Engineering Mathematics. Foxwell, Birmingham.
5. Zill, D. G., & Wright, W. S. (2011). Engineering Mathematics.

MIT | Academy of Engineering	COURSE SYLLABUS
(An Autonomous Institute Affiliated to Savitribai Phule Pune University)	

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Calculus and Differential Equations Tutorial
	COURSE CODE	2301101U
	COURSE CREDITS	1
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	TUTORIAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	1	NIL	NIL	NIL	20	30	50

PREREQUISITE : NIL

COURSE OBJECTIVES :

2301101U.CEO.1: To apply the concepts of partial differentiation.

2301101U.CEO.2: Demonstrate an understanding towards the applications of partial differentiation.

2301101U.CEO.3: Examine methods for solving first-order first-degree ordinary differential equations.

2301101U.CEO.4: Infer the applications of first-order differential equations.

2301101U.CEO.5: Determine the solution of linear differential equations of second and higher order.

2301101U.CEO.6: Solve first-order linear and nonlinear partial differential equations.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301101U.CO.1: Make use of properties of partial differentiation to solve the problems [L3].

2301101U.CO.2: Examine the applications of partial differentiation [L4].

2301101U.CO.3: Solve first-order and first-degree ordinary differential equations [L2].

2301101U.CO.4: Analyze real-world phenomenon governed by first-order ordinary differential equations [L4].

2301101U.CO.5: Apply concepts of solving linear differential equations of second and higher order governing different systems in engineering [L4].

2301101U.CO.6: Determine solutions of various partial differential equations by theoretical methods [L3].

COURSE ABSTRACT

The course focuses on developing important mathematical concepts in a comprehensible, coherent and rigorous way. This is achieved by means of a carefully balanced approach by including the topics of calculus and differential equations which will foster the analytical thinking, and problem solving abilities of the students. Students are encouraged to apply their mathematical knowledge to solve problems and clear their doubts through tutorial sessions. Students embarking on this course will be able to identify and solve various differential equation problrms and will be intellectually equipped with the links between these concepts and their core engineering and real life problems. This course will enable them to tackle the problems of differential equations that they encounter in other engineering courses.

TUTORIALS

TUTORIAL NO.01	**Partial Differentiation**	**01 HOUR**
Problems On Partial Differentiation: Introduction, Chain rule, Total derivative, Change of variables.		
TUTORIAL NO.02	**Partial Differentiation**	**01 HOUR**
Problems On Homogeneous functions, Euler's Theorem, Differentiation of Implicit functions.		
TUTORIAL NO.03	**Applications of Partial Differentiation**	**01 HOUR**
Problems on Jacobian, Jacobian of Implicit functions, Partial derivative of an implicit function.		
TUTORIAL NO.04	**Applications of Partial Differentiation**	**01 HOUR**
Problems on Functional dependence, Maxima and Minima of functions of two variables.		
TUTORIAL NO.05	**Ordinary Differential Equations**	**01 HOUR**
Problems on Exact differential equations, Differential equations reducible to exact form-Integrating factors.		
TUTORIAL NO.06	**Ordinary Differential Equations**	**01 HOUR**
Linear differential equations, Differential equations reducible to linear form.		
TUTORIAL NO.07	**Applications of Ordinary Differential Equations**	**01 HOUR**
Orthogonal Trajectories, Newton's law of cooling, Growth & Decay.		
TUTORIAL NO.08	**Applications of Ordinary Differential Equations**	**01 HOUR**
Electric circuits, Chemical applications- Mixing problems.		
TUTORIAL NO.09	**Linear Differential Equations of Higher Order**	**01 HOUR**
General solutions of linear differential equations with constant coefficients, Shortcut methods to find P.I.		
TUTORIAL NO.10	**Linear Differential Equations of Higher Order**	**01 HOUR**
Shortcut methods to find P.I., Method of variation of parameters, Cauchy and Legendre's linear differential equation.		

TUTORIAL NO.11	Partial Differential Equations	01 HOUR

Introduction and formation of partial differential equation, solution of a partial differential equation, equations solvable by direct integration.

TUTORIAL NO.12	Partial Differential Equations	01 HOUR

Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.

TUTORIAL NO.13	Guest Lecture	02 HOUR

Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.

TUTORIAL NO.14	Doubt Clearing Session	01 HOUR

Linear differential equations of first order, Non-linear differential equations of first order, Charpit's method.

TEXT BOOKS

1. Ramana, B. V. (2017). Higher Engineering Mathematics. Tata McGraw-Hill Education.
2. Grewal, B. S., & Grewal, J. S. (2018). Higher engineering mathematics. 2002, Khanna Publishers, New Delhi.

REFERENCE BOOKS

1. Thomas, G. B., Weir, M. D., Hass, J., & Giordano, F. R. (2002). Thomas' calculus (pp. 2379-8858). Addison-Wesley.
2. Kreyszig, E. (2015). Advanced Engineering Mathematics 10E All Access Pack. John Wiley & Sons.
3. Jain, R. K., & Iyengar, S. R. K. (2002). Advanced Engineering Mathematics, Narosa Pub.
4. O'Neil, P. V. (2012). Engineering Mathematics. Foxwell, Birmingham.
5. Zill, D. G., & Wright, W. S. (2011). Engineering Mathematics.

COURSE SYLLABUS

SCHOOL OF CHEMICAL ENGINEERING		**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY		**COURSE NAME**	Science of Nature
		COURSE CODE	2301104T
		COURSE CREDITS	3
RELEASE DATE : 01/08/2023		**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
3	NIL	30	20	50	NIL	NIL	100

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

2301104T.CEO.1: Make students conversant with basic Biology regarding the life processes.

2301104T.CEO.2: Study biology and engineering as biologically inspired technologies like designs in nature, bioenergetics, bioprocesses, biomaterials, biomechanics, and bioinstrumentation.

2301104T.CEO.3: To define the role of chemistry for engineers via atomic structure and green chemistry principles.

2301104T.CEO.4: To define the basic aspects and applications of polymers, biomaterials & composites.

2301104T.CEO.5: To illustrate the basic principles, instrumentation & applications of analytical techniques.

2301104T.CEO.6: To outline the technology involved in improving quality of water for its industrial use.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301104T.CO.1: Illustrate natural biological processes and their technical aspects that changed human life by applying engineering principles [L2].

2301104T.CO.2: Explain the impact of chemical bonding on engineering materials and properties [L2].

2301104T.CO.3: Demonstrate proficiency in applying green chemistry principles to engineering solutions [L2].

2301104T.CO.4: Make use of advanced instrumental methods for the analysis of chemical compounds [L3].

2301104T.CO.5: Analyze information from case studies and applications to strategize solutions for complex real-world engineering challenges [L4].

COURSE ABSTRACT

The fundamental objective of the Science of Nature course is to provide the extended knowledge of chemistry & biology required for engineering courses. The course defines the role of chemistry for engineers via topics like atomic structure & green chemistry principles. A few topics like Formation of Materials which covers chemical bonding and their influence on chemical properties & Engineering materials are included. This enables students to understand the application of chemistry in electronic gadgets, in construction, chemical compounds as a conducting materials, as smart materials, as nano materials viz carbon nano materials etc. Further, the analysis part involves various instrumental methods. It is aimed to give information about the advanced characterization and separation techniques of chemical compounds. The biology part of the course includes phenomena observed in nature viz., Physical, Chemical and Biological along with the case studies and applications. This gives much needed information about natural biological processes and their technical aspects in view of optimizing Engineering solutions. This promotes the applicability of engineering in understanding of chemistry/biology and visa-versa.

THEORY COURSE CONTENTS

UNIT 1	Introduction to Science of Nature	8 HOURS

Contents: The basics of science of nature. Exploring science in nature, specially symmetry, spiral, golden ratio, pattern and fractal. The phenomenon observed in nature viz., Physical, Chemical and Biological. Case studies and Applications. The diversity and commonality of cells, protein structure and function, basic molecular genetic mechanisms, bio membranes and cell architecture, transport of ions and small molecules across Cell membranes, cellular energetics, cell birth, lineage and death.
Self Study: Physiological activities.

UNIT 2	Applications of Biology	7 HOURS

Physiologic Systems - An Outline of Cardiovascular Structure and Function, Endocrine System, Nervous System, Vision System, Defense mechanisms in plants and animals. Introduction to Bio Sensors, Performance Factors, Factors Affecting the Performance of Sensors, Areas of Application. Biological Sensing Elements, Biological transducers. Discovery and Innovations in applications of Biology. **Self Study:** Locomotion.

UNIT 3	The Role of Chemistry for Engineers	8 HOURS

Applications/Case Study: Hydrogen Spectrum.

(A) **Introduction:** This section is an introduction to chemistry and chemical methods for engineering students. It describes how chemistry is used in engineering and how chemical principles aid engineers in the choice of materials for a particular application. Principles of Green chemistry are reviewed. The classification of separation methods used for mixtures. (B) **Periodic Table:** This section covers the names and symbols of the elements. The basic structure of the atom is reviewed including an explanation of isotopes. A discussion of the atomic structure describes electronic shells, subshells, their quantum numbers, orbital shapes, electron filling order, and the determination of the complete electron configuration of the elements. General description of the modern periodic table. Correlation between the valence electron configurations and the chemical properties of the elements. The periodic trends according to the position of the elements in the periodic table.

Self Study: Slater's rule for ion.

UNIT 4	Chemical Bonding - The Formation of Materials	9 HOURS

(A) **The Formation of Materials:** This section covers chemical bonding and its effect on the chemical properties of the elements. Ionic bonding & covalent bonding are compared in terms of the octet rule and valence bond theory. Polar and non-polar covalent bonds. Molecular orbital theory is introduced to explain magnetism, bond order and hybridization helpful in Carbon chemistry. Intermolecular forces, including hydrogen bonding, are discussed with a special Case Study focusing on the special properties of water.

(B) **Engineering Materials:** This section covers the Resources of Natural Materials, Introduction to Material Sciences viz. Polymers, Specialty polymers, Biomaterials, Nano materials and Smart materials with their examples and applications.

Self Study: Real life applications of smart materials.

UNIT 5	Chemical Analysis and Instrumentation	7 HOURS

This chapter covers some of the more common instrumental methods used for the qualitative and quantitative analysis of materials. The principles of chromatography are introduced with paper chromatography and later applied to thin layer chromatography, pH-metry and Conductometry are reviewed as a few important and basic methods for analysis of chemical compounds and a case study on the analysis of water samples is given as an example. UV-visible absorption spectroscopy is reviewed as one of the sophisticated analytical techniques.

Self Study: Applications in Bio-medical field.

UNIT 6	Water Treatment and Effluent Management	6 HOURS

Applications/Case Study: Water analysis of river Indrayani.

This chapter covers types of impurities in water & the conventional water treatment methods. Hardness, Alkalinity and Chloride content of water, its causes, types and volumetric methods for their determinations are reviewed along with numerical. Various water softening & treatment methods which includes filtration methods by Carbon adsorption, ion-exchange methods and membrane techniques are explained.

TEXT BOOKS

1. Jain, P. C., & Jain, M. (1998). Engineering Chemistry: Chemistry of Engineering Materials. Dhanpat Rai Pub. Com.
2. Khopkar, S. M. (2008). Basic of Concept of Analytical Chemistry; 3 rd Edn; New AGF International Pvt. Ltd. Publisher, New Delhi, 1-5.
3. Chauhan, B. S. (2008). Engineering Chemistry. Laxmi Publications, Ltd..
4. Lodish, H., Berk, A., Kaiser, C. A., Kaiser, C., Krieger, M., Scott, M. P., ... & Matsudaira, P. (2008). Molecular cell biology. Macmillan.

REFERENCE BOOKS

1. Gaffney, J., & Marley, N. (2017). General chemistry for engineers. Elsevier.
2. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (2013). Fundamentals of analytical chemistry. Cengage learning.
3. Willard, H. H., Merritt Jr, L. L., Dean, J. A., & Settle Jr, F. A. (1988). Instrumental methods of analysis.
4. Pradeep, T. (2012). Textbook of nanoscience and nanotechnology. McGraw-Hill Education.

COURSE SYLLABUS

SCHOOL OF CHEMICAL ENGINEERING		**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY		**COURSE NAME**	Science of Nature Lab
		COURSE CODE	2301104L
		COURSE CREDITS	1
RELEASE DATE : 01/08/2023		**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	30	50

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

2301104L.CEO.1: Make students conversant with basic Biology regarding the life processes.

2301104L.CEO.2: Study biology and engineering as biologically inspired technologies like designs in nature, bioenergetics, bioprocesses, biomaterials, biomechanics, and bioinstrumentation.

2301104L.CEO.3: To define the role of chemistry for engineers via atomic structure and green chemistry principles.

2301104L.CEO.4: To define the basic aspects and applications of polymers, biomaterials & composites.

2301104L.CEO.5: To illustrate the basic principles, instrumentation & applications of analytical techniques.

2301104L.CEO.6: To outline the technology involved in improving quality of water for its industrial use.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301104L.CO.1: Illustrate natural biological processes and their technical aspects that changed human life by applying engineering principles [L2].

2301104L.CO.2: Explain the impact of chemical bonding on engineering materials and properties [L2].

2301104L.CO.3: Demonstrate proficiency in applying green chemistry principles to engineering solutions [L2].

2301104L.CO.4: Make use of advanced instrumental methods for the analysis of chemical compounds [L3].

2301104L.CO.5: Analyze information from case studies and applications to strategize solutions for complex real-world engineering challenges [L4].

COURSE ABSTRACT

The fundamental objective of the Science of Nature course is to provide the extended knowledge of chemistry & biology required for engineering courses. The course defines the role of chemistry for engineers via topics like atomic structure & green chemistry principles. A few topics like Formation of Materials which covers chemical bonding and their influence on chemical properties & Engineering materials are included. This enables students to understand the application of chemistry in electronic gadgets, in construction, chemical compounds as a conducting materials, as smart materials, as nano materials viz carbon nano materials etc. Further, the analysis part involves various instrumental methods. It is aimed to give information about the advanced characterization and separation techniques of chemical compounds. The biology part of the course includes phenomena observed in nature viz., Physical, Chemical and Biological along with the case studies and applications. This gives much needed information about natural biological processes and their technical aspects in view of optimizing Engineering solutions. This promotes the applicability of engineering in understanding of chemistry/biology and visa-versa.

PRACTICALS: Any 8 Experiments will be conducted.		
PRACTICAL NO.01	**Distillation**	**2 HOURS**
Separation of two miscible liquids using distillation process.		
PRACTICAL NO.02	**Polymerization**	**2 HOURS**
Synthesis by condensation polymerization reaction.		
PRACTICAL NO.03	**Nano Particle**	**4 HOURS**
Synthesis of nano particles using reduction method.		
PRACTICAL NO.04	**pH Metry**	**4 HOURS**
Determination of the dissociation constant of a weak acid using pH meter.		
PRACTICAL NO.05	**Paper Chromatography**	**2 HOURS**
Separation of inorganic cations by paper chromatography.		
PRACTICAL NO.06	**TLC**	**2 HOURS**
Separation of organic compounds by TLC.		
PRACTICAL NO.07	**Conductometry**	**4 HOURS**
Conductometric titration for mixture of acids.		
PRACTICAL NO.08	**Colorimetry / Spectrophotometry**	**2 HOURS**
Absorption studies.		
PRACTICAL NO.09	**Hardness of Water**	**4 HOURS**
Determination of Hardness of water by EDTA method.		
PRACTICAL NO.10	**Alkalinity**	**2 HOURS**
Determination of alkalinity of water by neutralization titration.		
PRACTICAL NO.11	**Adsorption Studies**	**2 HOURS**
Water purification by activated charcoal.		
PRACTICAL NO.12	**Physical Phenomenon**	**2 HOURS**
Case Studies of Physical Phenomenon		
PRACTICAL NO.13	**Chemical Phenomenon**	**2 HOURS**
Case Studies of Chemical Phenomenon		
PRACTICAL NO.14	**Biological Phenomenon**	**2 HOURS**
Case Studies of Biological Phenomenon		

TEXT BOOKS

1. Jain, P. C., & Jain, M. (1998). Engineering Chemistry: Chemistry of Engineering Materials. Dhanpat Rai Pub. Com.
2. Khopkar, S. M. (2008). Basic of Concept of Analytical Chemistry; 3 rd Edn; New AGF International Pvt. Ltd. Publisher, New Delhi, 1-5.
3. Chauhan, B. S. (2008). Engineering Chemistry. Laxmi Publications, Ltd..
4. Lodish, H., Berk, A., Kaiser, C. A., Kaiser, C., Krieger, M., Scott, M. P., ... & Matsudaira, P. (2008). Molecular cell biology. Macmillan.

REFERENCE BOOKS

1. Gaffney, J., & Marley, N. (2017). General chemistry for engineers. Elsevier.
2. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (2013). Fundamentals of analytical chemistry. Cengage learning.
3. Willard, H. H., Merritt Jr, L. L., Dean, J. A., & Settle Jr, F. A. (1988). Instrumental methods of analysis.
4. Pradeep, T. (2012). Textbook of nanoscience and nanotechnology. McGraw-Hill Education.

SCHOOL OF COMPUTER ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Foundation of Computing
	COURSE CODE	2304101T
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	15	20	40	NIL	NIL	75

PREREQUISITE : Basics of Computer and Mathematics

COURSE OBJECTIVES :

2304101T.CEO.1: Make students understand the fundamental programming concepts such as variables, data types, operators, control structures, and functions in C programming.

2304101T.CEO.2: Help acquire proficiency in writing syntactically correct and semantically meaningful C code, adhering to the language standards.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2304101T.CO.1: Explain fundamental programming concepts such as variables, data types, operators, control structures, and functions in C programming [L2].

2304101T.CO.2: Design an algorithm and flowchart for the given problem [L3].

2304101T.CO.3: Explain the working of pointers with suitable examples of pointer to array, pointer to string, pointer to structure [L2].

COURSE ABSTRACT

The Course focuses on logic building of the students. C is the best programming language to start learning in computer programming. The significance of the C programming language is that it is recognized worldwide and used in many of the applications, including advanced scientific systems and operating systems. The C language provides the base language of all advanced computer languages. Course contains basic elements of C programming,data types, operators, Control Structures, conditional statements, looping , arrays, string operations, functions, pointers,user defined data types-structure and union, file handling functions supported by C language.

THEORY+PRACTICAL COURSE CONTENT

UNIT 1	Fundamentals of C	4 + 4 HOURS

Application/Case Study: Gaming applications, calculator application

Module 1:

Theory:

Introduction to programming, why to learn programming, programming for everybody, Overview of C, Character set, Constants, Variables and Keywords, Data types

Lab Assignment:

1. Introduction to Problem Solving Tools- Algorithm and Flowchart

Home Assignment: To practice more problems on Flogorithm tool

Module 2:

Theory :

Operators - arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operator, Expressions- Type Conversion, precedence and order of evaluation

Lab Assignment:

1. Write a menu driven program in C to display addition, subtraction, multiplication, division of two numbers

Home Assignments:

1. Write a program in C to display the quotient and remainder after the division of two numbers

2. Write a program to evaluate any mathematical expression and observe the operator precedence

3. Write a program in C to demonstrate the use of left shift, right shift, and, or, xor operators

4. Write a program in C to demonstrate increment and decrement operators

UNIT 2	Control Structures	6 + 6 HOURS

Application/Case Study: Ticket Booking App, online shopping site

Module 1:

Theory:

Decision Control Structure-If statement, if-else statement, Nested if-else statement, Ternary operator, Case Control structure- Switch Case Statements, GOTO statement

Lab Assignments:

1. Write a program in C to display the grade obtained by the student in a course. The input will be the marks obtained and the output will be the grade obtained

Home Assignments:

1. Get the information of lengths of sides and angles of triangle and print the type of triangle whether it is equilateral, isosceles or scalene, right, acute or obtuse.

2. Prepare a grocery bill after applying 5% discount for new customer and 10% discount for regular customer.

3. Demonstrate use of ternary operator.

Module 2:

Theory:

Loop Control Structure- while statement, do while statement, for statement, odd loop, nesting of loops, break and continue statement, finite & infinite Loop.

Lab Assignments:

1. Write a program in C to display first N numbers on the screen using while, do while and for loop

2. Write a program in C to display first N number in reverse order on the screen using while, do while and for loop

3. Write a program in C display various patterns using * (Any two Patterns)

Home Assignments:

1. More on Patterns - Different Patterns to be instructed

2. Print sequence of squares of all prime numbers in the given range

3. Print all palindrome numbers in the range of 100 to 200

UNIT 3	Arrays, Strings and Functions	8 + 8 HOURS

Module 1:

Application/Case Study: Leader Board of a game, possible moves in games, Computer Screen, image processing

Theory : Array Declaration and Initialization, Bounds Checking, Array arithmetic, One dimensional arrays and multi-dimensional Arrays

Lab Assignments:

1. Write a program in C to perform matrix addition

2. Write a program in C to implement linear search and binary search algorithms for a numeric array.

Home Assignments:

1. Write a program in C to perform matrix multiplication

2. Take three different arrays to store numbers divisible by 2, 3 and 5 respectively. Get 20 numbers as input and place them in appropriate array.

3. Get a two digit number from user(n), if the number is prime then put it in the array of prime numbers otherwise in the array of non- prime numbers.

Module 2:

Application/Case Study: Spell Checkers, Spam Filters, Search Engines, Plagiarism Detection, Bio informatics, Digital Forensics and Information Retrieval Systems

Theory : Strings - Standard Library String Functions, Array of strings, String operations

Lab Assignments:

1. Write a program in C to convert every lowercase letter to uppercase letter and vice versa

2. Write a program in C to implement the string functions using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, sub string

Home Assignments:

1. Write a C program to display input string in the following format aBCDeFGHiJK—-NoPQ i.e. Vowels in small and consonants in capital

2. Write a C program to display input string in the following format by identifying the conversion.e.g. input- string then output- uvtkpi

Module 3:

Theory : Functions, procedures, Difference between functions and procedures, Function definition and prototype, Scope Rule of Functions, Calling Conventions, Passing Values between Functions - Call by Values, Recursive functions, Passing Array Elements to a Function

Lab Assignments:

1. Write a menu driven program in C using functions to implement the following string operations without using the standard library functions, string length, string copy, string reverse

2. Write a program in C using recursion to display the factorial of a given number

Home Assignments:

1. Write a C function to find simple interest. Pass input values as parameters

2. Write a menu driven program in C using functions to implement the following string operations without using the standard library functions, string concatenate, string compare, string palindrome

3. Write a program in C using recursion to display the Fibonacci sequence for a given range

4. Write a program in C using recursion to display the series of squares of even numbers for a given range

UNIT 4	Pointers	8 + 8 HOURS

Application/Case Study: Dynamic Memory Allocation, Implementation of Data Structures

Module 1:

Theory : Pointers and Addresses, Pointer Notation & Arithmetic, Pointer to an array, Array of pointers

Lab Assignments:

1. Write a program to differentiate between pointer to an integer and pointer to an array of integers

2. Write a program to print addresses of array elements using pointers

Module 2:

Theory : Pointer to a function, Passing pointers as function arguments, function call by reference, difference between call by value and call by reference

Lab Assignments:

1. Write a C function to swap values of two variables using call by reference.

Module 3:

Theory : Strings and Pointers, Structures and Pointers

Lab Assignments:

1. Write a program to store and access string using pointer to string

Home Assignments:

1. Use structure and pointers to maintain books data. Depending upon the number of readers of a book measure the popularity of that book

2. Write a C program to perform insert & delete operations on the stack using pointer

3. Write a C program to perform insert & delete operations on the queue using pointer

4. Print numbers within given range by passing the function pointer as a parameter

5. Demonstrate working of circular linked list using pointers

UNIT 5	User Defined Data Types	4+4 HOURS

Application/Case Study: Memory management

Module 1:

Theory: Structures & Union: Declaration of Structure and Union, Difference between Structure and Union, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures.

Lab Assignments:

1. Write a program in C to accept the information of five students and store it in structure and display the same

Home Assignments:

1. Write a C program using structure to store employee data (Name and salary) , then display name of the manager who is having highest salary, and obtain total expenditure of company on employee's salary

2. Use C structure to maintain Olympic game's data. Store the information of medals won by several countries. Depending upon the types of medals won by the respective country give the rank

TEXT BOOKS

1. E. Balguruswamy , "Computing Fundamentals and C Programming" , Tata Mc-Graw Hill, ISBN 13: 978-0-07-066909-3
2. Balagurusamy, E. (2016). Programming In Ansi C.
3. Kanetkar, Y. (2018). Let us C. BPB publications.
4. Yashavant, K. (2020). Let us C. BPB Publications.
5. Kernighan, B. W., & Ritchie, D. M. (2002). The C programming language.
6. GHOSH, S. (2008). All of C. PHI Learning Pvt. Ltd.

REFERENCE BOOKS

1. Hanly, J. R., & Koffman, E. B. (2007). Problem solving and program design in C. Pearson Education India.

2. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, Oxford University Press, ISBN 13 978-0-19-806528-9

3. S. Thamrai Selvi, R Murugesan, "Test your skills in C", Tata Mcgraw Hill, ISBN13:978-0-07-044759-2

4. Yashvant Kanitkar, "C Projects", BPB Publication, 2nd Edition, ISBN 81-7029-256-5

5. R.G. Dromey , "How to solve it by Computer", Prentice Hall, ISBN -13. 978-0134340012

6. Byron S. Gottfried, Jitender Kumar Chhabra, "Programming with C", Tata Mcgraw Hill, ISBN13:978-0- 07-059369-5

SCHOOL OF COMPUTER ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))

FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Foundation of Computing Lab
	COURSE CODE	2304101L
	COURSE CREDITS	1
RELEASE DATE : 01/08/2023	**REVISION NO**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	30	50

PREREQUISITE : Basics of Computer and Mathematics

COURSE OBJECTIVES :

2304101L.CEO.1: Extending the help to Students to acquire skills in debugging C programs using tools like gdb and understanding common error types encountered in C programming, such as syntax errors, logical errors, and runtime errors.

2304101L.CEO.2: Guide students to build significant programming projects using C, applying their knowledge and skills acquired throughout the course to design, implement, test, and present a functional software solution.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2304101L.CO.1: Write and execute basic programs in C to perform tasks such as arithmetic operations, conditional statements, looping constructs, and basic I/O operations [L3].

2304101L.CO.2: Build modular, reusable code using functions, header files, and libraries in C [L3].

2304101L.CO.3: Identify alternate programming solutions for a given problem [L3].

COURSE ABSTRACT

The Course focuses on logic building of the students. C is the best programming language to start learning in computer programming. The significance of the C programming language is that it is recognized worldwide and used in many of the applications, including advanced scientific systems and operating systems. The C language provides the base language of all advanced computer languages. Course contains basic elements of C programming,data types, operators, Control Structures, conditional statements, looping , arrays, string operations, functions, pointers,user defined data types-structure and union, file handling functions supported by C language.

THEORY+PRACTICAL COURSE CONTENT

UNIT 1	Fundamentals of C	4 + 4 HOURS

Application/Case Study: Gaming applications, calculator application

Module 1:

Theory:

Introduction to programming, why to learn programming, programming for everybody, Overview of C, Character set, Constants, Variables and Keywords, Data types

Lab Assignment:

1. Introduction to Problem Solving Tools- Algorithm and Flowchart

Home Assignment: To practice more problems on Flogorithm tool

Module 2:

Theory :

Operators - arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operator, Expressions- Type Conversion, precedence and order of evaluation

Lab Assignment:

1. Write a menu driven program in C to display addition, subtraction, multiplication, division of two numbers

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1. Write a program in C to display the quotient and remainder after the division of two numbers

2. Write a program to evaluate any mathematical expression and observe the operator precedence

3. Write a program in C to demonstrate the use of left shift, right shift, and, or, xor operators

4. Write a program in C to demonstrate increment and decrement operators

UNIT 2	Control Structures	6 + 6 HOURS

Application/Case Study: Ticket Booking App, online shopping site

Module 1:

Theory:

Decision Control Structure-If statement, if-else statement, Nested if-else statement, Ternary operator, Case Control structure- Switch Case Statements, GOTO statement

Lab Assignments:

1. Write a program in C to display the grade obtained by the student in a course. The input will be the marks obtained and the output will be the grade obtained

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1. Get the information of lengths of sides and angles of triangle and print the type of triangle whether it is equilateral, isosceles or scalene, right, acute or obtuse.

2. Prepare a grocery bill after applying 5% discount for new customer and 10% discount for regular customer.

3. Demonstrate use of ternary operator.

Module 2:

Theory:

Loop Control Structure- while statement, do while statement, for statement, odd loop, nesting of loops, break and continue statement, finite & infinite Loop.

Lab Assignments:

1. Write a program in C to display first N numbers on the screen using while, do while and for loop

2. Write a program in C to display first N number in reverse order on the screen using while, do while and for loop

3. Write a program in C display various patterns using * (Any two Patterns)

Home Assignments:

1. More on Patterns - Different Patterns to be instructed

2. Print sequence of squares of all prime numbers in the given range

3. Print all palindrome numbers in the range of 100 to 200

UNIT 3	Arrays, Strings and Functions	8 + 8 HOURS

Module 1:

Application/Case Study: Leader Board of a game, possible moves in games, Computer Screen, image processing

Theory : Array Declaration and Initialization, Bounds Checking, Array arithmetic, One dimensional arrays and multi-dimensional Arrays

Lab Assignments:

1. Write a program in C to perform matrix addition

2. Write a program in C to implement linear search and binary search algorithms for a numeric array.

Home Assignments:

1. Write a program in C to perform matrix multiplication

2. Take three different arrays to store numbers divisible by 2, 3 and 5 respectively. Get 20 numbers as input and place them in appropriate array.

3. Get a two digit number from user(n), if the number is prime then put it in the array of prime numbers otherwise in the array of non- prime numbers.

Module 2:

Application/Case Study: Spell Checkers, Spam Filters, Search Engines, Plagiarism Detection, Bio informatics, Digital Forensics and Information Retrieval Systems

Theory : Strings - Standard Library String Functions, Array of strings, String operations

Lab Assignments:

1. Write a program in C to convert every lowercase letter to uppercase letter and vice versa

2. Write a program in C to implement the string functions using the standard library functions supported by string.h like: string length, string copy, string reverse, string concatenate, string compare, sub string

Home Assignments:

1. Write a C program to display input string in the following format aBCDeFGHiJK—-NoPQ i.e. Vowels in small and consonants in capital

2. Write a C program to display input string in the following format by identifying the conversion.e.g. input- string then output- uvtkpi

Module 3:

Theory : Functions, procedures, Difference between functions and procedures, Function definition and prototype, Scope Rule of Functions, Calling Conventions, Passing Values between Functions - Call by Values, Recursive functions, Passing Array Elements to a Function

Lab Assignments:

1. Write a menu driven program in C using functions to implement the following string operations without using the standard library functions, string length, string copy, string reverse

2. Write a program in C using recursion to display the factorial of a given number

Home Assignments:

1. Write a C function to find simple interest. Pass input values as parameters

2. Write a menu driven program in C using functions to implement the following string operations without using the standard library functions, string concatenate, string compare, string palindrome

3. Write a program in C using recursion to display the Fibonacci sequence for a given range

4. Write a program in C using recursion to display the series of squares of even numbers for a given range

UNIT 4	**Pointers**	**8 + 8 HOURS**

Application/Case Study: Dynamic Memory Allocation, Implementation of Data Structures

Module 1:

Theory : Pointers and Addresses, Pointer Notation & Arithmetic, Pointer to an array, Array of pointers

Lab Assignments:

1. Write a program to differentiate between pointer to an integer and pointer to an array of integers

2. Write a program to print addresses of array elements using pointers

Module 2:

Theory : Pointer to a function, Passing pointers as function arguments, function call by reference, difference between call by value and call by reference

Lab Assignments:

1. Write a C function to swap values of two variables using call by reference.

Module 3:

Theory : Strings and Pointers, Structures and Pointers

Lab Assignments:

1. Write a program to store and access string using pointer to string

Home Assignments:

1. Use structure and pointers to maintain books data. Depending upon the number of readers of a book measure the popularity of that book

2. Write a C program to perform insert & delete operations on the stack using pointer

3. Write a C program to perform insert & delete operations on the queue using pointer

4. Print numbers within given range by passing the function pointer as a parameter

5. Demonstrate working of circular linked list using pointers

UNIT 5	User Defined Data Types	4+4 HOURS

Application/Case Study: Memory management

Module 1:

Theory: Structures & Union: Declaration of Structure and Union, Difference between Structure and Union, Accessing Structure Elements, How Structure Elements are Stored, Array of Structures.

Lab Assignments:

1. Write a program in C to accept the information of five students and store it in structure and display the same

Home Assignments:

1. Write a C program using structure to store employee data (Name and salary) , then display name of the manager who is having highest salary, and obtain total expenditure of company on employee's salary

2. Use C structure to maintain Olympic game's data. Store the information of medals won by several countries. Depending upon the types of medals won by the respective country give the rank

TEXT BOOKS

1. E. Balguruswamy , "Computing Fundamentals and C Programming" , Tata Mc-Graw Hill, ISBN 13: 978-0-07-066909-3
2. Balagurusamy, E. (2016). Programming In Ansi C.
3. Kanetkar, Y. (2018). Let us C. BPB publications.
4. Yashavant, K. (2020). Let us C. BPB Publications.
5. Kernighan, B. W., & Ritchie, D. M. (2002). The C programming language.
6. GHOSH, S. (2008). All of C. PHI Learning Pvt. Ltd.

REFERENCE BOOKS

1. Hanly, J. R., & Koffman, E. B. (2007). Problem solving and program design in C. Pearson Education India.
2. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, Oxford University Press, ISBN 13 978-0-19-806528-9
3. S. Thamrai Selvi, R Murugesan, "Test your skills in C", Tata Mcgraw Hill, ISBN13:978-0-07-044759-2
4. Yashvant Kanitkar, "C Projects", BPB Publication, 2nd Edition, ISBN 81-7029-256-5
5. R.G. Dromey , "How to solve it by Computer", Prentice Hall, ISBN -13. 978-0134340012
6. Byron S. Gottfried, Jitender Kumar Chhabra, "Programming with C", Tata Mcgraw Hill, ISBN13:978-0- 07-059369-5

MIT | Academy of Engineering
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SCHOOL OF CIVIL ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Applied Mechanics
	COURSE CODE	2303101T
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	15	20	40	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2303101T.CEO.1: To define fundamental concepts and laws of rigid body mechanics.

2303101T.CEO.2: To state conditions of equilibrium for engineering structures.

2303101T.CEO.3: To describe kinematic parameters of rectilinear and curvilinear motion.

2303101T.CEO.4: To explain energy and momentum methods of kinetics"

COURSE OUTCOMES :

The students after completion of the course will be able to,

2303101T.CO.1: Determine the resultant of system of forces acting on bodies. [L1]

2303101T.CO.2: Calculate the support reactions and member forces for simple structures. [L2]

2303101T.CO.3: Analyse bodies in rectilinear and curvilinear motion. [L4]

2303101T.CO.4: Apply energy and momentum methods for kinetics problems. [L3]

COURSE ABSTRACT

This course is built on the foundation and framework of mathematics and physics. The course requires students to have strong abstract thinking and reasoning skills. In addition, Concepts will be applied in this course from previous courses you have taken in basic math and physics. The course addresses the modeling and analysis of real world engineering applications and problem solving. In this course, we shall be learning about interaction between bodies dealing with STATICS and in the second part DYNAMICS students will study the motion of particles. Statics covers free body diagrams, equilibrium of rigid bodies, analysis of trusses and beams, discussion on friction, virtual work and stability. Dynamics deals with general plane motion of rigid bodies, use of translating and rotating motion frames of reference for analysis, plane kinetics and work energy principle.

THEORY COURSE CONTENTS

UNIT 1	Basics of Statics	7 HOURS

Applications/Case Study: Failure of any building, bridge etc.

Contents: Fundamental Concepts and Principles in mechanics, Force and force systems, Resolution, Resultant, and Moment of a force system; Equilibrium of a particle systems. Free body diagram (FBD). Equilibrium of rigid bodies.

Self Study: Observe the static objects around you and draw free body diagram and calculate resultant of same.

UNIT 2	Applications of Statics	8 HOURS

Applications/Case Study: Determination of axial forces for industrial truss.

Contents: Types of supports and their reactions. Beam reactions, Analysis of cables, Analysis of trusses, and Analysis of frames. Centroid of plane laminas. Engineering applications of friction. Belt Friction, Wedge friction.

Self Study: Understanding following questions are expected from the students.

1. What does it mean for a design of members to be "Statically indeterminable"?
2. What is a "Two force Member"?
3. Which forces are allowed on a member?

UNIT 3	Kinematics of particle	8 HOURS

Applications/Case Study: Falling Body and Projectile Motion Case Study.

Contents: Basic concepts in kinematics- Position, velocity, acceleration, jerk. Rectilinear motion with constant and variable acceleration. Connected body motions. Relative motion. Curvilinear motion in Cartesian coordinates and path coordinates.

Self Study: Study of gyroscopic motion.

UNIT 4	Kinetics of particle	7 HOURS

Contents: Kinetics- Equation of motion. Concept of work done, energy and power. Principle of work and energy. Conservation of energy. Principle ref impulse and momentum. Conservation of momentum. Collisions- Direct central impact. Coefficient of restitution.

Self Study: Study of vehicle dynamics.

TEXT BOOKS

1. Nelason, A. (2009). Engineering Mechanics: Statics and Dynamics. 2nd Edition, Tata McGraw-Hill Education.
2. Anil Kumar D. (2015). Engineering Mechanics: Statics Dynamics", 1st edition, Tata McGraw-Hill Education.

REFERENCE BOOKS

1. Hibbeler, R. C. (2009). Gupta Ashok Engineering Mechanics: Statics Dynamics.", 14th Edition, Pearson Education Inc., Prentice Hall.

SCHOOL OF CIVIL ENGINEERING		**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY		**COURSE NAME**	Applied Mechanics
		COURSE CODE	2303101L
		COURSE CREDITS	3
RELEASE DATE : 01/08/2023		**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	NIL	NIL	NIL	NIL	20	30	50

PREREQUISITE : NIL

COURSE OBJECTIVES :

2303101L.CEO.1: To provide students with hands-on experience and practical knowledge in the field of applied mechanics.

2303101L.CEO.2: To bridge the gap between theoretical concepts learned in the classroom and real-world applications.

2303101L.CEO.3: To develop a deep understanding of fundamental mechanics principles and their practical implications.through a combination of experiments and projects,"

COURSE OUTCOMES :

The students after completion of the course will be able to,

2303101L.CO.1: Develop a practical understanding of fundamental mechanics principles and apply theoretical knowledge to solve real-world engineering problems [L3].

2303101L.CO.2: Analyze, and interpret experimental data, and present results in a clear and organized manner [L4].

2303101L.CO.3: Design, conduct, and analyze experiments by effective collbrating with team members [L6].

2303101L.CO.4: Build ethical behavior in conducting experiments, handling data, and interacting with colleagues [L3]. "

COURSE ABSTRACT

The Applied Mechanics Laboratory serves as a crucial platform for understanding fundamental principles and practical applications of mechanics in engineering. This abstract provides an overview of the objectives, methodologies, and potential outcomes of experiments conducted within this laboratory setting.The primary goal of the Applied Mechanics Laboratory is to provide students with hands-on experience in exploring and analyzing various mechanical phenomena. Through a series of carefully designed experiments, participants gain insights into the behavior of materials and structures under different loading conditions. The laboratory covers a diverse range of topics, including statics and dynamics.Experiments within the laboratory involve the use of state-of-the-art equipment and measurement tools to investigate the mechanical characteristics of materials such as metals, polymers, and composites. Static experiments focus on equilibrium conditions and the study of forces and moments, while dynamic experiments explore the dynamic response of structures to external forces.

PRACTICALS/ACTIVITIES

PRACTICAL NO.01	**Parallelogram Law**	**2 HOURS**
To verify parallelogram law of force addition.		
PRACTICAL NO.02	**Law of moments**	**2 HOURS**
To verify law of moments for parallel forces.		
PRACTICAL NO.03	**Block Friction**	**2 HOURS**
To determine coefficient of static friction for a block on a plane.		
ACTIVITY NO.01	**Truss model**	**2 HOURS**
To develop truss model.		
PRACTICAL NO.04	**Belt Friction**	**2 HOURS**
To determine coefficient of static friction for a flat belt on a drum.		
PRACTICAL NO.05	**Centroid 1D**	**2 HOURS**
To determine centroid of composite wire object.		
PRACTICAL NO.06	**Centroid 2D**	**2 HOURS**
To determine centroid of composite plane lamina.		
ACTIVITY NO.02	**Model making for Centroid**	**2 HOURS**
To develop the model for centroid.		
PRACTICAL NO.07	**Projectile Motion**	**2 HOURS**
To analyze projectile motion in Cartesian coordinates.		
ACTIVITY NO.03	**Model making for Projectile**	**2 HOURS**
To develop the model for projectile.		

PRACTICAL NO.08	Compound Pendulum	2 HOURS
To determine mass moment of Inertia of compound pendulum.		
PRACTICAL NO.09	Fly Wheel	2 HOURS
To analyse rotational motion of a flywheel about a fixed axis.		
ACTIVITY NO.04	Model of parachute	2 HOURS
To develop the parachute model.		
PRACTICAL NO.10	Direct Central Impact	2 HOURS
To determine coefficient of restitution for direct central impact.		
PRACTICAL NO.11	Final Exam	2 HOURS
For all batches during the lab hours.		

TEXT BOOKS

1. Meriam, J. L., Kraige, L. G., & Bolton, J. N. (2020). Engineering mechanics: dynamics. John Wiley & Sons.

REFERENCE BOOKS

1. NIL

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SCHOOL OF MECHANICAL ENGINEERING

	W.E.F	2023 - 2024 (Rev.2022(NEP))

FIRST YEAR BACHELOR OF TECHNOLOGY

COURSE NAME	Design Thinking
COURSE CODE	2309101T
COURSE CREDITS	1

RELEASED DATE : 01/08/2023

REVISION NO	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
1	NIL	15	NIL	20	NIL	NIL	35

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

2309101T.CEO.1: To identify User centric approach.

2309101T.CEO.2: To utilize information collection tools to clearly define user centric problem.

2309101T.CEO.3: To apply divergent thinking to find diverse solutions.

COURSE OUTCOMES:

The students after completion of the course will be able to,

2309101T.CO.1: Apply design thinking approach to find all the dimensions of user and his needs [L3].

2309101T.CO.2: Apply information gathering techniques to select user centric problem [L3].

COURSE ABSTRACT

Design thinking is a powerful process of problem solving as it deals with human centred design approach. When design thinking approaches are applied to business, the success rate for innovation improves substantially. The course aim to imbibe understanding of the design thinking process and apply it to real-world problems while building their strong teamwork and communication skills. Students will learn to use the design thinking process to solve complex problems and create innovative solutions. Course covers topics such as research, ideation, prototyping, testing, and iteration. Students also learn to use a variety of design thinking tools, such as personas, journey maps, mind mapping, SWOT analysis, SCAMPER, Brainstorming, AEIOU framework etc. Students work in team to tackle real-world design challenges. So they learn how to communicate their ideas effectively and how to receive and give constructive feedback and present their design solutions in aclear and compelling manner. Upon completion of the course, students will have a deep understanding of the design thinking process and how to apply it to real-world problems. They will be able to use a variety of design thinking tools and techniques to generate and evaluate ideas, create prototypes, and test and refine their solutions. They will also have strong teamwork and communication skills, making them valuable members of any design team.

THEORY COURSE CONTENTS

UNIT 1	FUNDAMENTALS OF DESIGN THINKING	2 HOURS

Introduction to design, types of design, Introduction to Design Thinking, Divergent Thinking, Convergent Thinking.
Various types of thinking: Critical thinking, Creative thinking, lateral thinking, Disruptive Thinking.
Self Study: Timeline.

UNIT 2	HUMAN CENTRED DESIGN	2 HOURS

Introduction to Human Centred Design, Human Centred Design Phases, Human Centred Design Process, Human Centred Design case study, Planet centric Design.
Self Study: Customer Journey Map.

UNIT 3	ANTHROPOLOGY	2 HOURS

Characteristics of Anthropology: Culture, holistic approach, field work, multiple theories and purposes of anthropology. Empathy and Ethnography.
Self Study- Ethnograpy: AEIOU Framework.

UNIT 4	RESEARCH METHODOLOGY	3 HOURS

Design thinking Models & Methodology, General Problem Statement, Random check list, mind mapping, Categorization of random check list, Brainstorming of problem areas Research Methodology – Information gathering – Primary, Secondary Sources, data presentation, Preparation of survey forms, Survey Analysis, Drawing Inference.
Self Study: Likert Scale, Affinity Diagram, Reverse engineering of a research paper to identify all the essential elements of the research.

UNIT 5	IDEATION	4 HOURS

SWOT analysis, Vein Diagram (User Desirability, Feasibility, Viability check) Drawing inferences, Translation of inferences into design criteria, specific problem statement, Ideation – free hand sketching drawing of simple form of products (Isometric views, layout, circuit diagram, Ideation sketches), Ergonomic and aesthetic consideration in design.
Case Study: SCAMPER, TRIZ.

UNIT 6	PROTOTYPING	2 HOURS

Concept validation, evaluation and detailing, Different methods of Prototyping, selection of right method of prototyping.
Case Study: Minimum Viable Product.

TEXT BOOKS

1. Yayici, E. (2016). Design thinking methodology book. ArtBizTech.
2. Mootee, I. (2013). Design thinking for strategic innovation: What they can't teach you at business or design school. John Wiley & Sons.
3. Lockwood, T. (2010). Design thinking: Integrating innovation, customer experience, and brand value. Simon and Schuster.
4. Marc, S. (2012). This is Service Design Thinking: Basics-Tools-Cases. Bis Publishers.

REFERENCE BOOKS

1. Jones, J. C. (1992). Design methods. John Wiley & Sons.
2. Cross, N. (2011). Design thinking: Understanding how designers think and work. Berg.
3. Gonen, E. (2020). Tim brown, change by design: how design thinking transforms organizations and inspires innovation (2009). Markets, Globalization & Development Review, 4(2).
4. Melles, G., de Vere, I., & Misic, V. (2011). Socially responsible design: thinking beyond the triple bottom line to socially responsive and sustainable product design. CoDesign, 7(3-4), 143-154.
5. Kumar, V. (2012). 101 design methods: A structured approach for driving innovation in your organization. John Wiley & Sons.

MIT Academy of Engineering (An Autonomous Institute Affiliated to SPPU)	COURSE SYLLABUS	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	2023 - 2024 (Rev.2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Design Thinking Lab
	COURSE CODE	2309101L
	COURSE CREDITS	1
RELEASED DATE : 01/08/2023	**REVISION NO**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	20	40

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

2309101L.CEO.1: To infer the feasibility, desirability and viability criteria's for selection of appropriate solution.

2309101L.CEO.2: To test the concept using a prototype.

COURSE OUTCOMES:

The students after completion of the course will be able to,

2309101L.CO.1: Build multiple solutions through ideation process [L3].

2309101L.CO.2: Evaluate most appropriate solution for defined user centric problem [L5].

2309101L.CO.3: Build the prototype of the most optimum solution [L6].

COURSE ABSTRACT

Design thinking is a powerful process of problem solving as it deals with human centred design approach. When design thinking approaches are applied to business, the success rate for innovation improves substantially. The course aim to imbibe understanding of the design thinking process and apply it to real-world problems while building their strong teamwork and communication skills. Students will learn to use the design thinking process to solve complex problems and create innovative solutions. Course covers topics such as research, ideation, prototyping, testing, and iteration. Students also learn to use a variety of design thinking tools, such as personas, journey maps, mind mapping, SWOT analysis, SCAMPER, Brainstorming, AEIOU framework etc. Students work in team to tackle real-world design challenges. So they learn how to communicate their ideas effectively and how to receive and give constructive feedback and present their design solutions in aclear and compelling manner. Upon completion of the course, students will have a deep understanding of the design thinking process and how to apply it to real-world problems. They will be able to use a variety of design thinking tools and techniques to generate and evaluate ideas, create prototypes, and test and refine their solutions. They will also have strong teamwork and communication skills, making them valuable members of any design team.

PRACTICALS:(Project Work)		
PRACTICAL NO.01		**4 HOURS**
Needs Finding (Observation of Domain) **Self Study:** space Interaction.		
PRACTICAL NO.02		**4 HOURS**
Research methodology		
PRACTICAL NO.03		**4 HOURS**
Product Specification **Self Study:** RUTAG Project Exploration.		
PRACTICAL NO.04		**4 HOURS**
Ideation		
PRACTICAL NO.05		**4 HOURS**
Concept Evaluation, Validation and Concept detailing **Self Study:** Pugh Matrix.		
PRACTICAL NO.06		**6 HOURS**
Prototyping		
PRACTICAL NO.07		**4 HOURS**
Documentation		

TEXT BOOKS

1. Yayici, E. (2016). Design thinking methodology book. ArtBizTech.
2. Mootee, I. (2013). Design thinking for strategic innovation: What they can't teach you at business or design school. John Wiley & Sons.
3. Lockwood, T. (2010). Design thinking: Integrating innovation, customer experience, and brand value. Simon and Schuster.
4. Marc, S. (2012). This is Service Design Thinking: Basics-Tools-Cases. Bis Publishers.

REFERENCE BOOKS

1. Jones, J. C. (1992). Design methods. John Wiley & Sons.
2. Cross, N. (2011). Design thinking: Understanding how designers think and work. Berg.
3. Gonen, E. (2020). Tim brown, change by design: how design thinking transforms organizations and inspires innovation (2009). Markets, Globalization & Development Review, 4(2).
4. Melles, G., de Vere, I., & Misic, V. (2011). Socially responsible design: thinking beyond the triple bottom line to socially responsive and sustainable product design. CoDesign, 7(3-4), 143-154.
5. Kumar, V. (2012). 101 design methods: A structured approach for driving innovation in your organization. John Wiley & Sons.

	COURSE SYLLABUS
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SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022) (NEP)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electronics Workshop
	COURSE CODE	2306161T
	COURSE CREDITS	1
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
1	NIL	15	NIL	20	NIL	NIL	35

PREREQUISITE : NIL

COURSE OBJECTIVES :

2306161T.CEO.1: Identify the appropriate electronic components for specific requirements.

2306161T.CEO.2: Handle testing and measuring instruments.

2306161T.CEO.3: Get conversant with process of Printed Circuit Board Design and Fabrication.

2306161T.CEO.4: Make aware of Surface-Mount Technology.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2306161T.CO.1: Apply the knowledge of the functionality of different types of electronics components, interpretation of their data sheets, measuring instruments, Through Hole technology, Surface-Mount technology, Printed circuit board, and soldering methods to solve engineering problems [L3].

2306161T.CO.2: Demonstrate fundamental skills using modern engineering tools for the simulation of electronic circuits considering the specifications of the components [L3].

2306161T.CO.3: Develop a solution in a team for engineering problems on the breadboard considering the safety guidelines [L4].

2306161T.CO.4: Build a Printed Circuit Board in a team using modern tools for an electronic project and communicate it through effective presentation and demonstration [L4].

COURSE ABSTRACT

The course is structured to provide a balanced blend of theoretical concepts and hands-on practical training to the students and enabling them to confidently delve into the diverse world of electronic components, gaining insight into their characteristics, behaviors, and compatibility. This course also develops the skill to handle and interpret measurements obtained from different electronic measuring instruments. It is a comprehensive course designed to equip students with the skills and knowledge required to design and fabricate Printed Circuit Board (PCB) by following safety practices to meet standards and design specifications required to develop a prototype. In addition with PCB fabrication, the students get acquainted with a comprehensive understanding of Surface Mount Technology (SMT) principles, processes, and applications.

THEORY COURSE CONTENTS

UNIT 1	Electronic Components	04 HOURS

Contents: Functionality and types of electronic components - Active, Passive, Electrical, Electronic, Electro-mechanical. IC packages (Single in-line, Zigzag in-line etc.) Drawing of electronic circuit diagrams using BIS/IEEE symbols. Selection of Components as per requirement of any specific application. .
Self Case-Study: Comparative analysis of applications of different electronics components.

UNIT 2	Testing and Measuring Instruments	05 HOURS

Contents: Functionality diagram, working and use of Testing and Measuring instruments and tools: Digital Multimeter, True RMS meter, Function generator, LCR Meter, Power supply, CRO, DSO, Analog & Digital IC Tester etc. Inter-connection methods and soldering practice: Bread board, Wrapping, Crimping, Soldering – types – selection of materials and safety precautions. Fault finding case-study of any electronic instrument.
Self Study: DOs and DON'Ts – Safety guidelines while handling electronics instruments.

UNIT 3	PCB Design and Fabrication	04 HOURS

Contents: Printed circuit boards (PCB): Types, Single sided, Double sided, PTH. Process of PCB Design and Fabrication for any electronic circuit..
Case Study: Industrial application of PCB design and fabrication.

UNIT 4	Surface-Mount Technology	02 HOURS

Contents: Introduction, Surface-mount vs Through-Hole, Types, advantages, disadvantages and application of SMT.
Self Case-Study: Pick and Place machine.

TEXT BOOKS

1. J C Whitakar, (2005), *The Electronics Handbook*, 2nd edition, CRC press, ISBN 9780367250010
2. Walter C. Bosshart,(1983), *Printed Circuit Boards: Design and Technology.* Tata McGraw-Hill Education, ISBN: 978-0074515495.
3. H.S.Kalsi, (2019), *Electronic Instruments and Measurements*, McGraw Hill Education, 4th Edition, ISBN: 978-9353162511.

REFERENCE BOOKS

1. Horowitz Paul, (2018), *Art of Electronics*, 3rd edition,Cambridge University Press, ISBN: 9780521809269
2. Raghunandan G H, (2019), *Basic Electronics: A Simplified Approach*, Cengage Learning India Pvt. Ltd.
3. Purkait Prithwiraj, (2013). *Electrical and Electronics Measurement and Instrumentation*, 1st edition, McGraw-Hill Education, ISBN-13: 978-1259029592

MIT | Academy of Engineering	COURSE SYLLABUS	
(An Autonomous Institute Affiliated to Savitribai Phule Pune University)		

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	W.E.F	**AY:** 2023 - 2024 (Rev. 2022) (NEP)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electronics Workshop Lab
	COURSE CODE	2306161L
	COURSE CREDITS	1
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	20	40

PREREQUISITE : NIL

COURSE OBJECTIVES :

2306161L.CEO.1: Identify the appropriate electronic components for specific requirements.

2306161L.CEO.2: Handle testing and measuring instruments.

2306161L.CEO.3: Get conversant with process of Printed Circuit Board Design and Fabrication.

2306161L.CEO.4: Make aware of Surface-Mount Technology.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2306161L.CO.1: Select the appropriate electronic components for specific requirements. [L3].

2306161L.CO.2: Analyse any electronic circuit using suitable measuring instrument. [L3].

2306161L.CO.3: Fabricate Printed Circuit Board for a prototype [L3].

2306161L.CO.4: Justify the significance of Surface-Mount Technology for recent industrial requirements. [L3].

COURSE ABSTRACT

The course is structured to provide a balanced blend of theoretical concepts and hands-on practical training to the students and enabling them to confidently delve into the diverse world of electronic components, gaining insight into their characteristics, behaviors, and compatibility. This course also develops the skill to handle and interpret measurements obtained from different electronic measuring instruments. It is a comprehensive course designed to equip students with the skills and knowledge required to design and fabricate Printed Circuit Board (PCB) by following safety practices to meet standards and design specifications required to develop a prototype. In addition with PCB fabrication, the students get acquainted with a comprehensive understanding of Surface Mount Technology (SMT) principles, processes, and applications.

PRACTICALS

PRACTICAL NO.01	Identification of Electronic Components	2 HOURS

Identification of following electronic components with specifications - type, size, color coding, package, symbol, cost, ratings etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Displays, Fasteners, Heat sink etc.

PRACTICAL NO.02	Drawing the electronic circuit with standard symbols.	2 HOURS

Introduction to EDA tools to draw the electronic circuit with standard symbols. (such as Dia or XCircuit)

PRACTICAL NO.03	Interpretation of Data sheets and simulation	2 HOURS

Interpret data sheets of discrete components and IC's, Estimation and costing, Introduction to the Simulation Tool to simulate electronic circuit.

PROJ. ACTIVITY 1	Simulation of electronic circuit

Simulation of simple circuits using electronic components (inclusive of minimum one DIP IC).

PRACTICAL NO.04	Testing of electronic components	2 HOURS

Testing of electronic components: Resistor, Capacitor, LED, Diode, Transistor and JFET using Digital Multimeter.

PRACTICAL NO.05	Hands-on with Testing and Measuring instruments and Tools	4 HOURS

Hands-on with Testing and Measuring instruments and commonly used tools: Digital Multimeter, True RMS meter, Function generator, LCR Meter, Power supply, CRO, DSO, Analog & Digital IC Tester, Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Hot air soldering and de- soldering station etc.

PRACTICAL NO.06	Open-it and Explore	2 HOURS

Exploration of the inside view of circuitry of electronic equipment.

PROJ. ACTIVITY 2	Implementation on Bread Board and analysis using instruments.	
Analysis of input and output waveforms of any circuit using appropriate measuring instrument.		
PRACTICAL NO.07	**PCB Layout**	**2 HOURS**
PCB layout design with EDA Tools.		
PRACTICAL NO.08	**Design and fabrication of a single sided PCB**	**4 HOURS**
Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride), drilling and mounting.		
PROJ. ACTIVITY 3	**PCB Design and Fabrication**	**2 HOURS**
Assembling of electronic circuit/system on single sided PCB, test and show the functioning of any circuit		
PRACTICAL NO.09	**Surface Mounted Devices**	**2 HOURS**
Assembly of Surface-mounted Devices (SMD).		

TEXT BOOKS

1. J C Whitakar, (2005), *The Electronics Handbook*, 2nd edition, CRC press, ISBN 9780367250010
2. Walter C. Bosshart,(1983), *Printed Circuit Boards: Design and Technology.* Tata McGraw-Hill Education, ISBN: 978-0074515495.
3. H.S.Kalsi, (2019), *Electronic Instruments and Measurements*, McGraw Hill Education, 4th Edition, ISBN: 978-9353162511.

REFERENCE BOOKS

1. Horowitz Paul, (2018), *Art of Electronics*, 3rd edition,Cambridge University Press, ISBN: 9780521809269
2. Raghunandan G H, (2019), *Basic Electronics: A Simplified Approach*, Cengage Learning India Pvt. Ltd.
3. Purkait Prithwiraj, (2013). *Electrical and Electronics Measurement and Instrumentation*, 1st edition, McGraw-Hill Education, ISBN-13: 978-1259029592

		COURSE SYLLABUS

MIT | Academy of Engineering
(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022) (NEP)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electronics Workshop
	COURSE CODE	2306161T
	COURSE CREDITS	1
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
1	NIL	15	NIL	20	NIL	NIL	35

PREREQUISITE : NIL

COURSE OBJECTIVES :

2306161T.CEO.1: Identify the appropriate electronic components for specific requirements.

2306161T.CEO.2: Handle testing and measuring instruments.

2306161T.CEO.3: Get conversant with process of Printed Circuit Board Design and Fabrication.

2306161T.CEO.4: Make aware of Surface-Mount Technology.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2306161T.CO.1: Apply the knowledge of the functionality of different types of electronics components, interpretation of their data sheets, measuring instruments, Through Hole technology, Surface-Mount technology, Printed circuit board, and soldering methods to solve engineering problems [L3].

2306161T.CO.2: Demonstrate fundamental skills using modern engineering tools for the simulation of electronic circuits considering the specifications of the components [L3].

2306161T.CO.3: Develop a solution in a team for engineering problems on the breadboard considering the safety guidelines [L4].

2306161T.CO.4: Build a Printed Circuit Board in a team using modern tools for an electronic project and communicate it through effective presentation and demonstration [L4].

COURSE ABSTRACT

The course is structured to provide a balanced blend of theoretical concepts and hands-on practical training to the students and enabling them to confidently delve into the diverse world of electronic components, gaining insight into their characteristics, behaviors, and compatibility. This course also develops the skill to handle and interpret measurements obtained from different electronic measuring instruments. It is a comprehensive course designed to equip students with the skills and knowledge required to design and fabricate Printed Circuit Board (PCB) by following safety practices to meet standards and design specifications required to develop a prototype. In addition with PCB fabrication, the students get acquainted with a comprehensive understanding of Surface Mount Technology (SMT) principles, processes, and applications.

THEORY COURSE CONTENTS

UNIT 1	Electronic Components	04 HOURS

Contents: Functionality and types of electronic components - Active, Passive, Electrical, Electronic, Electro-mechanical. IC packages (Single in-line, Zigzag in-line etc.) Drawing of electronic circuit diagrams using BIS/IEEE symbols. Selection of Components as per requirement of any specific application. .
Self Case-Study: Comparative analysis of applications of different electronics components.

UNIT 2	Testing and Measuring Instruments	05 HOURS

Contents: Functionality diagram, working and use of Testing and Measuring instruments and tools: Digital Multimeter, True RMS meter, Function generator, LCR Meter, Power supply, CRO, DSO, Analog & Digital IC Tester etc. Inter-connection methods and soldering practice: Bread board, Wrapping, Crimping, Soldering – types – selection of materials and safety precautions. Fault finding case-study of any electronic instrument.
Self Study: DOs and DON'Ts – Safety guidelines while handling electronics instruments.

UNIT 3	PCB Design and Fabrication	04 HOURS

Contents: Printed circuit boards (PCB): Types, Single sided, Double sided, PTH. Process of PCB Design and Fabrication for any electronic circuit..
Case Study: Industrial application of PCB design and fabrication.

UNIT 4	Surface-Mount Technology	02 HOURS

Contents: Introduction, Surface-mount vs Through-Hole, Types, advantages, disadvantages and application of SMT.
Self Case-Study: Pick and Place machine.

TEXT BOOKS

1. J C Whitakar, (2005), *The Electronics Handbook*, 2nd edition, CRC press, ISBN 9780367250010
2. Walter C. Bosshart,(1983), *Printed Circuit Boards: Design and Technology*. Tata McGraw-Hill Education, ISBN: 978-0074515495.
3. H.S.Kalsi, (2019), *Electronic Instruments and Measurements*, McGraw Hill Education, 4th Edition, ISBN: 978-9353162511.

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1. Horowitz Paul, (2018), *Art of Electronics*, 3rd edition,Cambridge University Press, ISBN: 9780521809269
2. Raghunandan G H, (2019), *Basic Electronics: A Simplified Approach*, Cengage Learning India Pvt. Ltd.
3. Purkait Prithwiraj, (2013). *Electrical and Electronics Measurement and Instrumentation*, 1st edition, McGraw-Hill Education, ISBN-13: 978-1259029592

MIT Academy of Engineering (An Autonomous Institute Affiliated to Savitribai Phule Pune University)	COURSE SYLLABUS		
SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022) (NEP)	
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electronics Workshop Lab	
	COURSE CODE	2306161L	
	COURSE CREDITS	1	
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0	

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	20	40

PREREQUISITE : NIL

COURSE OBJECTIVES :

2306161L.CEO.1: Identify the appropriate electronic components for specific requirements.

2306161L.CEO.2: Handle testing and measuring instruments.

2306161L.CEO.3: Get conversant with process of Printed Circuit Board Design and Fabrication.

2306161L.CEO.4: Make aware of Surface-Mount Technology.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2306161L.CO.1: Select the appropriate electronic components for specific requirements. [L3].

2306161L.CO.2: Analyse any electronic circuit using suitable measuring instrument. [L3].

2306161L.CO.3: Fabricate Printed Circuit Board for a prototype [L3].

2306161L.CO.4: Justify the significance of Surface-Mount Technology for recent industrial requirements. [L3].

COURSE ABSTRACT

The course is structured to provide a balanced blend of theoretical concepts and hands-on practical training to the students and enabling them to confidently delve into the diverse world of electronic components, gaining insight into their characteristics, behaviors, and compatibility. This course also develops the skill to handle and interpret measurements obtained from different electronic measuring instruments. It is a comprehensive course designed to equip students with the skills and knowledge required to design and fabricate Printed Circuit Board (PCB) by following safety practices to meet standards and design specifications required to develop a prototype. In addition with PCB fabrication, the students get acquainted with a comprehensive understanding of Surface Mount Technology (SMT) principles, processes, and applications.

PRACTICALS

PRACTICAL NO.01	Identification of Electronic Components	2 HOURS

Identification of following electronic components with specifications - type, size, color coding, package, symbol, cost, ratings etc. Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Displays, Fasteners, Heat sink etc.

PRACTICAL NO.02	Drawing the electronic circuit with standard symbols.	2 HOURS

Introduction to EDA tools to draw the electronic circuit with standard symbols. (such as Dia or XCircuit)

PRACTICAL NO.03	Interpretation of Data sheets and simulation	2 HOURS

Interpret data sheets of discrete components and IC's, Estimation and costing, Introduction to the Simulation Tool to simulate electronic circuit.

PROJ. ACTIVITY 1	Simulation of electronic circuit

Simulation of simple circuits using electronic components (inclusive of minimum one DIP IC).

PRACTICAL NO.04	Testing of electronic components	2 HOURS

Testing of electronic components: Resistor, Capacitor, LED, Diode, Transistor and JFET using Digital Multimeter.

PRACTICAL NO.05	Hands-on with Testing and Measuring instruments and Tools	4 HOURS

Hands-on with Testing and Measuring instruments and commonly used tools: Digital Multimeter, True RMS meter, Function generator, LCR Meter, Power supply, CRO, DSO, Analog & Digital IC Tester, Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Hot air soldering and de- soldering station etc.

PRACTICAL NO.06	Open-it and Explore	2 HOURS

Exploration of the inside view of circuitry of electronic equipment.

PROJ. ACTIVITY 2	Implementation on Bread Board and analysis using instruments.	
Analysis of input and output waveforms of any circuit using appropriate measuring instrument.		

PRACTICAL NO.07	PCB Layout	2 HOURS
PCB layout design with EDA Tools.		

PRACTICAL NO.08	Design and fabrication of a single sided PCB	4 HOURS
Design and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride), drilling and mounting.		

PROJ. ACTIVITY 3	PCB Design and Fabrication	2 HOURS
Assembling of electronic circuit/system on single sided PCB, test and show the functioning of any circuit		

PRACTICAL NO.09	Surface Mounted Devices	2 HOURS
Assembly of Surface-mounted Devices (SMD).		

TEXT BOOKS

1. J C Whitakar, (2005), *The Electronics Handbook*, 2nd edition, CRC press, ISBN 9780367250010
2. Walter C. Bosshart,(1983), *Printed Circuit Boards: Design and Technology.* Tata McGraw-Hill Education, ISBN: 978-0074515495.
3. H.S.Kalsi, (2019), *Electronic Instruments and Measurements*, McGraw Hill Education, 4th Edition, ISBN: 978-9353162511.

REFERENCE BOOKS

1. Horowitz Paul, (2018), *Art of Electronics*, 3rd edition,Cambridge University Press, ISBN: 9780521809269
2. Raghunandan G H, (2019), *Basic Electronics: A Simplified Approach*, Cengage Learning India Pvt. Ltd.
3. Purkait Prithwiraj, (2013). *Electrical and Electronics Measurement and Instrumentation*, 1st edition, McGraw-Hill Education, ISBN-13: 978-1259029592

SCHOOL OF MECHANICAL ENGINEERING		W.E.F	AY: 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Computer Aided Engineering Drawing Lab
		COURSE CODE	2309161L
		COURSE CREDITS	2
RELEASE DATE : 01/08/2023		REVISION NO.	0.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	4	NIL	NIL	NIL	35	40	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2309161L.CEO.1: To illustrate the basic principles of engineering drawing related to projections of one, two, and three-dimensional objects.

2309161L.CEO.2: To Apply visualization skills for the development of simple Objects.

2309161L.CEO.3: To Interpret engineering drawings and technical specifications.

2309161L.CEO.4: To Expose students to explore computer-aided drafting tools for 3D modeling and drafting.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2309161L.CO.1: Demonstrate a simple engineering drawing in both First and Third-angle orthographic projections [L2].

2309161L.CO.2: Interpret engineering drawings and technical specifications [L2].

2309161L.CO.3: Apply visualization skills for the development of surfaces [L3].

2309161L.CO.4: Develop 2D Engineering Drawings by incorporating geometric shapes and symbols by using CAD software [L3].

2309161L.CO.5: Develop 3D Models from 2D Sketches using CAD tools and vice-versa [L3].

2309161L.CO.6: Design components that meet specific functional and aesthetic requirements using CAD software [L4].

COURSE ABSTRACT: (Brief description of course contents)

Computer Aided Engineeering Drawing course in which students thinking, visualization, and drafting skills are to be developed. Introduction to projection theory through various projections like Orthographic with 1D, 2D, and 3D objects Isometric, Auxiliary, freehand sketching, development of surfaces, and conic sections are included. Along with this developing the understanding through sketching, visualization, and CAD environment is introduced. Course instructions will be mostly through PowerPoint presentations, lectures, and classroom/workshop activities on model making and CAD software. To develop these skills, he/she must always be receptive and active in the classroom. The student knows how to plot a point on graph paper and some of the drawings he has done in his/her school days. We initiate the teaching by plotting points which further goes on to plotting lines, planes, solids, and views of objects. The teacher usually makes the students discuss amongst themselves the task/ question asked by me. They do the brainstorming and come up with some solutions. This helps teachers to stimulate their thinking. Once they complete the chapter, the Teacher gives them a short assignment, which the students have to solve and get peer-reviewed. This will make students responsible and the onus is up to them to acquire the comprehensive knowledge for peer assessment. The teacher has a separate set of questions for slow learners as their homework assignment, which will help them understand the fundamentals in a better way. Computer-Aided Design Software is used to develop students' skills and get updated on the recent developments in the domain.

DRAWING HALL PRACTICALS		
Module 1	**Quadrant System**	**02 HOURS**

Principle planes, Auxiliary Plane, Projection Methods, Projections of Points in various quadrant systems.
Activity 1: Quadrant System Model based learning .
Activity 2: Demonstration and drawing of Projections of Points on various principal planes with examples.

Module 2	**Projection of Lines**	**02 HOURS**

Projections of lines on various principle planes and inclined to both using Auxiliary Plane Method and Change of Position Method.
Activity 1: Model making on various principal planes using various materials like string, wire, etc.
Activity 2 : Demonstration and drawing of Projections of lines on various principal planes with real-life applications
Self Study: Practice projection of lines using AutoCAD software.
Further Readings: Applications of lines in various fields.

Module 3	**Projection of planes**	**04 HOURS**

Projections of the plane on various principle planes and inclined to both using Auxiliary Plane Method and Change of Position Method.
Activity 1: Model making using various materials like paper, sheet metal, etc.
Activity 2 : Demonstration and drawing of Projections of planes with real-life applications.
Self Study: Practice projection of planes using AutoCAD software.
Further Readings: Applications of the plane in various fields.

Module 4	Projection of Solids	04 HOURS

Projections of Regular Solids using Auxiliary Plane Method, First and Third Angle projection for simple mechanical objects.

Activity 1: Model making using Thermocol, clay etc.

Activity 2 : Demonstration and drawing of Projections of solids with suitable examples like Pyramids, Prisms, Cube, cylinders, etc. on various principal planes.

Self Study: Mathematical form of Geometrical Transformation.

Further Readings: Transformation of geometry using any software package.

Module 5	Orthographic Projections and Sectional Views	04 HOURS

Types of Orthographic Projections, Sectional Orthographic Projections, Sectional Views, Missing views.

Activity 1: Model-based learning in different Quadrant System

Activity 2 : Demonstration and drawing by using First Angle & Third Angle Projection Method

Self Study: Practice Orthographic projection using AutoCAD software.

Further Readings: Applications of Orthographic projections in various fields.

Module 6	Isometric Projection	04 HOURS

Isometric View, Isometric Scale, Non-isometric Lines, construction of Isometric View from the given orthographic view and construction of Isometric View of Pyramid, Cone, Sphere.

Activity 1: Model making using various materials like Thermocol, Clay, Paper, etc.

Activity 2 : Demonstration and drawing of Isometric View from the given orthographic view

Self Study: Isometric drawing using 3D AutoCAD software.

Further Readings: Drafting using FUSION 360 software.

Module 7	Section of Solids and Development of Surfaces	06 HOURS

Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders, and cones. Auxiliary Planes- Auxiliary Vertical Plane, Auxiliary Inclined Plane, Symmetrical Auxiliary View, Unilateral Auxiliary View, bilateral Auxiliary View.

Activity 1: Paper-based Model making by understanding the given problem statement.

Activity 2 : Demonstration and drawing of the Development of lateral surfaces of simple and sectioned solids with Auxiliary Views on Auxiliary planes.

Self Study: Applications in the Sheet Metal industry. Practice Auxiliary Views using any software package.

Further Readings: Understanding Thin Plate, Shells in the manufacturing industry. Applications of Auxiliary Views in Industries.

Module 8	Freehand Sketching and Conic Sections	04 HOURS

Free hand sketching- FV and TV of standard machine part- Hexagonal headed nut and bolt, foundation bolts, shafts, keys, couplings, springs, screw thread forms, welded joints, riveted joints, nozzles. Conic sections - Hyperbola, Cycloid, Involute and Spiral, Vernier Scales.

Activity 1: Identify various mechanical components during the Industrial Visit. Prepare the Freehand Sketch report.

Activity 2 : Model making using various materials like string, wire, etc. Demonstration and drawing of Conic sections with real-life applications.

Self Study: 3D modeling of Mechanical elements using any software package. Identify applications of conic sections in various areas like Toys, Automobile Industry etc.

Further Readings: Identify applications of Freehand sketches in various fields like Architecture, Automobile, Manufacturing, etc. Methods of drawing Engineering Curves.

PRACTICALS: Each Assignment with 2 questions Using 2D CAD Software		
PRACTICAL NO.01	**Absolute and incremental drafting**	**5 HOURS**
Drawing of 2 sketches using absolute and incremental commands		
PRACTICAL NO.02	**Draw commands, Modify commands, Array, fillet, offset commands**	**5 HOURS**
Drawing of 4 sketches using draw and modify commands		
PRACTICAL NO.03	**Project drafting**	**5 HOURS**
Drafting of a small project using all drafting standards		

PRACTICALS: Each Assignment with 2 questions Using 3D CAD Software		
PRACTICAL NO.04	**Sketching, Solid Modeling, Assembly**	**6 HOURS**
Modeling of 5 Mechanical models using 3D Software package		
PRACTICAL NO.05	**Project modeling**	**7 HOURS**
Modeling of a small Mechanical Project of Minimum 3 components		
PRACTICAL NO.06	**Course Portfolio Preparation**	**2 HOURS**

TEXT BOOKS

1. Jolhe, D. A. (2008). Engineering Drawing with an introduction to AutoCAD.
2. Basant Agarwal and C M Agarwal, (2019), "Engineering Drawing", TMH Publishing co Ltd, 3rd Edition.
3. John, K. C. (2009). Engineering Graphics for Degree. PHI Learning Pvt. Ltd.
4. R. K. Dhavan, (2012) A TextBook of Engineering Drawing, S Chand and co ltd., New Delhi India, 5Th Edition.

REFERENCE BOOKS

1. Luzadder, Warren J., Duff, John M, (2012), "Fundamentals of Engineering", Prentice Hall of India,11th Edition.
2. Basudev Bhattacharya, (2011), "Machine Drawing includes AutoCAD Supplements", Oxford University Press India, First Edition.
3. Venugopal, K. (2007). Engineering Drawing and Graphics+ Autocad. New Age International.
4. N B Shaha and B C Rana, (2012), "Engineering Drawing", Pearson Education.

	COURSE SYLLABUS	

MIT | Academy of Engineering

(An Autonomous Institute Affiliated to SPPU)

COURSE SYLLABUS

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Liberal Learning
	COURSE CODE	2301182
	COURSE CREDITS	1
RELEASE DATE : 01/08/2023	**REVISION NO**	0.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS						
		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	30	50

COURSE OBJECTIVES :

2301182.CEO.1: Create a comprehensive understanding of diverse forms of expression that contribute to liberal education

2301182.CEO.2: Create a broad set of skills and perspectives for overall development and personal well being.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301182.CO.1: Develop proficiency in expressive arts, amateur interest for holistic development as a lifelong learning [L6].

2301182.CO.2: Teach personal and social well-being through mind-body practices for the cultivation of free human beings [L3].

COURSE ABSTRACT

Liberal education is a learning approach that teaches students how to think independently and develop broad academic and intellectual abilities. It rests on a multidisciplinary and interdisciplinary approach. Education Policy, which had a revamp in 2020 has laid out a path for universities to adopt a liberal education, discussion based and discovery base mode of education. It encourages a multidisciplinary education system that helps develop the creative and analytical sides of the brain simultaneously. It inculcates transferable skill set, ability to apply knowledge to practical real-world situations, connecting the dots through various mental models, habits of self-reflection, contextual learning, freedom of the mind and lifelong learning. India needs a liberal education because to enhance Interdisciplinary and multidisciplinary approach to learning and Preparing students to become real-world person.

THEORY COURSE CONTENTS: Students may select any one of the following tracks.

Track 1	Chess	30 HOURS

Introduction to game of Chess. Rules, movement of pieces, strengths and weaknesses of all pieces. Stalemate, touch move, etiquette, pawn promotion and zugzwang, square of the pawn. Fundamental checkmate patterns, basic rules, special moves and rules such as castling, promotion, EnPassant, good moves for the opening.

Track 2	Kabaddi	30 HOURS

Recent trends in kabaddi - History and Development. a) Different forms played - Zemini, Sanjeevani & Amar. b) Different chants (cant) - Hadu-Du, Chedu-Gudu, Hu-tutu & other forms. c) Played in different size playfields with different number of players. d) No uniform rules and regulations, Traditional Kabaddi, Modern Kabaddi. Kabaddi Pioneers: Raiders, Escaping tactics by raiders in different situation, Before starting of the raid strategies, during the raid strategy and tactics, Turning, Falling and sliding as tactics, Creating gap to escape .

Track 3	Drama	30 HOURS

Introduction to Acting, Introduction to Theatre Techniques and Design Theatre History, Literature and Aesthetics, basics of Acting, Theatre Techniques and Design, and Theatre History, Literature and Aesthetics. In the second semester the same subjects are studied in details. Specialisation in Acting, Theatre Techniques and Design Theatre History, Literature and Aesthetic. Theatre History, Literature and Aesthetics, Acting (specialisation).

Track 4	Singing	30 HOURS

Vocal cords, Voice types, Female: Soprano or alto, Male: Tenor, baritone or bass, Breathing Techniques, Role of breathing in singing, types of scales and pitches, Musical notes foundation of any song, Humming exercise, tongue twisters, vowels, Tempo of song, Tempo Markings, Practicing all octaves, analysis of songs, practicing songs.

Track 5	Dance	30 HOURS

History, mythological aspects, and their impact on the dance form, movements, pattern of beats, use of these forms, Basic knowledge of: basic Adavu steps, hand gestures 'Mudra', Nritta, nrittya and Natakas, Tala, Gati, postures, moods, feet movements, and stances. Introduction to Bollywood dance, Basic Bollywood combinations/choreography, Introduction of styles of Bollywood, Introduction of dance choreographies from classic and modern Bollywood films, influence and inclusion of western dance. History of street dance steps and styles and the pioneers and dance legends involved in their creation, Basic steps of Hip Hop dance, Learn foundations & routines within hip hop culture, Types of hip hop: contemporary hip hop, lyrical hip hop, etc. Dance history, Learning about warm ups, floor work, standing work, travelling work, articulation of limbs, turns and jumps etc.

Track 6	Painting (Design)	30 HOURS

Object Drawing / Still Life - Graphic sketching, mutual proportion of object groups, space joiner, shadow differentiation on objects, Sketching and painting of object groups Memory Drawing - observation, memory and imagination, proportional sketching of incidents in daily life, closeness and distantness (perspective) in drawing. Design – creative expression, basic principles of design, effective use of colors and color shades, aesthetic sense and creation of utility through design, geometrical equipment and material, color mediums and techniques. Geometry, Solid Geometry and Lettering - Development of capability of use of geometrical constructions for creation of pattern, geometrical shapes and their construction.

Track 7	Sculpture Design	30 HOURS

The fundamental principles and techniques of sculpture, including the exploration of various materials and processes, sculptural skills and conceptual thinking. Introduction to sculpture, Brief history of sculpture, tools handling and techniques, material handling techniques, methods & applications – additive & subtractive, pinching method & slab method (application), concepts Development - perceive line as an edge, understanding fundamental elements & principles of sculpture tools handling and techniques, concept understanding.

Track 8	Introduction to photography	30 HOURS

Types of Lights, effect of Lights, Types of Lenses & their uses. Understanding the three main ingredients or elements or pillars of photography that work together: Aperture, Shutter Speed, and ISO. Understanding the concept of ISO sensitivity, in detail with hands-on session. Understanding the concept of Shutter Speed, effect of high & low shutter speed on photographs, with hands-on session. Concept of aperture, F-stop notations, effect of variation of aperture on images. Hands-on session. Compositional Rules like Rule of Thirds, Negative Space, Horizon Line, Golden ratio etc. Framing. Hands-on training. Difference between Auto focus & manual focus, Focusing the object manually, concept of depth of field with wide aperture lens. Hands-on. Framing in landscape photography, bird photography framing. Bokhe effect, Time lapse, multiple exposure, Silhouettes, Long exposure, Steel wool photography.

Track 9	Yoga and Meditation	30 HOURS

Brief history and philosophy of Yoga, benefits of Yoga, Key techniques of Yoga. Introduction to different types of Yoga, understanding the diversity of yoga practices and their origins, Yoga-Sutras, Limbs of Yoga. Introduction to Meditation, understanding the essence and benefits of meditation, introduction to different types and approaches to meditation, Meditation techniques for health promotion, Relaxation techniques. Overview of Postural alignment, importance of postures, Practices of various posture. Understanding the importance of a balanced diet for overall well-being, Principles of balanced nutrition, diet for preventive and curative aspects of health, Mind Power. Gentle warm-up and stretching, Introduction to seated forward bends and gentle backbends, Relaxation techniques: Guided progressive muscle relaxation. Introduction to breathing and its significance, understanding the role of breathing in overall well-being, importance of conscious breathing in stress reduction and relaxation. Yogic breathings techniques. Intended to various Asana, benefits of Asana. Introduction to pranayama, pranayama techniques for health promotion practical sessions, difference between pranayama and deep breathing, Anuloma-viloma, Suryabhedana, Ujjayi, Bharmari, Bhastrika, Shitali and Shitkari Pranayama. Understanding of Mudras and Kriyas, Practical sessions .

Track 10	Spiritual Minds	30 HOURS

1.Spirituality -True meaning of Spirituality and explaining the hierarchy of Inner world, awareness about Existence of God.2.Yoga & Meditation- Explaining the Chakras and the Aura, various types of Mediations.3.Respect, Gratitude & Reverence -Explaining the meaning Respect, Gratitude & Reverence by giving the examples from Mahabharata and try to cultivate these qualities in the students.4.Low of Forgiveness and Low of KARMA-Explaining the deepest meaning of Law of forgiveness and Law of KARMA and make the student refrain from unwholesome actions and behaviors.5.Relationship- how to maintain and improve the relationship with Parents, friends, people around us and NATURE.6.Physical and Mental Health – how to improve Physical and Mental health with the help of circadian rhythm, mediation, Pranayamas and yogasanas. How to become more productive.7.Stress Management- discuss the root cause of stress, types of Stress. Explain the techniques and remedies to overcome the Stress.8.Love Yourself – How to give quality time to 'yourself', how to make yourself anxiety free and find the real happiness within us.9.Let's Label jars and not people- how to refrain from to criticism and judgmental with the people around us.10.Goal setting- how to set goals in your life and how to achieve those goals in a positive manner.

Track 11	Content Writing	30 HOURS

Introduction to Content Writing, Writing Fundamentals, Research skills, Blog Writing, Website Writing, Role of SEO in Content Writing, Content Marketing Strategy, Portfolio Development & Career Opportunities, Branding (in copywriting point of view), Technical writing, UX/UI writing, AI in content writing (ChatGPT).

Track 12	Digital Marketing	30 HOURS

Basics digital marketing, analysis and keyword research, search engine optimization, on-page optimization, off-page optimization, SEO updates and analysis, local business and google mapping, google adwords or pay per click marketing (SEM), social media optimization, social media marketing, google web analytics, webmaster tools, creating a new simple website. Illustrating the dialog delivery, expressions, volume, pitch in the dialog, Expression through photography and editing skill with an expertise in handling cameras, microphone, effective management skill enabling the justification through foundation till representation.

Track 13	Social Work	30 HOURS

Importance of Empathy, Empathy and it's limits, Role of empathy and compassion for engineers, Empathy activities, Differences, Conservatives and Liberals, Disgust and Honor, Stereotypes, The Problem of Kindness, Skepticism About the Self, Free Will and the Situation, Recognizing emotions, reading body language, improving listening skills, mindful self-compassion, Compassionate Leadership, Origins of Morality, joy of giving, social responsibility, exercising social services.

Track 14	Indian Food Wisdom	30 HOURS

History - Introduction, Food consumed in different regions of India, Eating styles of India, Traditional equipment's used for cooking, changes in consumption of foods, Future of traditional foods, Advantages, types, health benefits of Indian food, Millets – Importance of millets in diet, millet as a medicine etc.

NOTE : More tracks can be added as per demand of the students and feasibility.

MIT | Academy of Engineering	COURSE SYLLABUS
(An Autonomous Institute Affiliated to Savitribai Phule Pune University)	

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Indian Knowledge Systems: Vedic Mathematics
	COURSE CODE	2306181
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	25	NIL	50	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2306181.CEO.1: To facilitate the students with the concepts of Indian traditional knowledge

2306181.CEO.2: To make them understand the Importance of roots of knowledge system.

2306181.CEO.3: To encourage students to think creatively and critically about mathematical concepts

2306181.CEO.4: To bring forward the extraordinary work done by Indian Mathematicians in the fields such as Astronomy, Astrology, Geometry, Algebra, and Arithmetic etc.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2306181.CO.1: Explain the history and broad classification of Indian knowledge System [L2].

2306181.CO.2: Outline the features of Indian numeral system and its role in science & technology advancement [L2].

2306181.CO.3: Apply key Vedic Mathematics principles by understanding foundational concepts and providing clear insights into the underlying principles and relationships [L3].

2306181.CO.4: Choose suitable Vedic mathematics approaches in solving specific types of problems [L3].

COURSE ABSTRACT:

This course will help learners to know and understand their own systems and traditions which are imperative for any real development and progress. Because of this course learners will think independently and originally with Indian frameworks and models for solving the problems of present day.

Vedic Mathematics will not have direct application in Electronics or E&TC Engineering as a specialized field, however it offers benefits and insights that are relevant in certain context.

It will be used in logic development, signal processing, data analysis and designing of algorithms. Recognizing patterns in numbers and exploiting these patterns to simplify calculation is one of the skill in Vedic Mathematics. This skill can be valuable in dealing with complex wave forms, data patterns, image and signal processing.

Deeper concepts like Fibonnaci series, Linear Algebra, Re-configurable Programming in VLSI, problem solving skills can be considered as applications of Vedic Mathematics in Electronics and E&TC discipline.

THEORY COURSE CONTENTS

UNIT 1	Indian Knowledge System – An Introduction	04 HOURS

Applications/Case Study: Connections between different fields of study and an affection for traditional knowledge
Contents: Introduction and need of IKS; historic importance of IKS; Why do we need IKS; Organization of IKS; Historicity of IKS; Some salient aspects of IKS
Further Readings/Self Study: Linkage of Mathematics and IKS

UNIT 2	Introduction to Indian Mathematics	02 HOURS

Applications/Case Study: Mathematical Innovations in 17th and 18th Century
Contents: Introduction to Indian Mathematics; Unique aspects of Indian Mathematics; Indian Mathematicians and their Contributions
Further Readings/Self Study: Impact of Mathematical Innovations on society

UNIT 3	Deep Insights in to Indian Mathematics	12 HOURS

Applications/Case Study: Basic Sutras and subsutras in Vedic Mathematics
Contents: Arithmetic; Algebra; Geometry; Trigonometry; Binary mathematics and combinational problems in Chandaḥ Śāstra; Magic squares in India
Further Readings/Self Study: application of Chandaḥ Śāstra in designing of algorithms

UNIT 4	Astronomy	04 HOURS

Applications/Case Study: Linear measures of celestial coordinate system.
Contents: Unique Aspects of Indian Astronomy, Historical Development, The Celestial Coordinate System, Elements of the Indian Calendar.
Further Readings/Self Study: Positional Astronomy.

ACTIVITY(a)	Activity Based on IKS (25 Marks)	01 HOUR

Activity based on the IKS will assess student's knowledge and comprehension of the course content. The purpose of the activity is to evaluate the participants' understanding and knowledge of IKS.

ACTIVITY(b)	Field Visit and Report Writing (25 Marks)	08 HOURS

Students are required to conduct a field visit to the local places mentioned below. Upon completion of the field visit, students must write a report on the visit, its analysis, and submit the detail report for assessment

Field Visit Guideline :

Archaeological Sites: Visit archaeological sites like ancient temples and caves (Karla, Bhaja Bedse Caves, old temples) Vedic mathematics emphasizes geometric principles and formulas. These principles may have been applied in the design and construction of ancient temples and caves. These architecture often involves intricate geometric patterns and proportions, which could have been influenced by Vedic mathematical concepts.

Museums: Explore museums that exhibit ancient artifacts, tools, and techniques. (Raja Dinkar Kelkar Museum, Mahatma Phule Museum, Deccan College Museum, Darshan Museum) Observe any mathematical symbols, notations, or representations found in ancient artifacts. These can provide clues about how mathematical concepts were recorded and communicated in ancient times.

Historical Monuments: Visit historical sites featuring iconic artifacts. (Aga Khan Palace, Shaniwar Wada, Sinhgad Fort) Recognize the interdisciplinary nature of Vedic mathematics by understanding its connections to architecture, astronomy, and religious practices. Explore how mathematics played a role in these diverse fields. Appreciate the importance of preserving and conserving archaeological sites that offer insights into Vedic mathematics and ancient knowledge systems.

Educational Institutions: Visit universities or research institutes with metallurgy depart- ments. These institutions often have laboratories and facilities that demonstrate cutting-edge research in Mathematics e.g. Savitribai Phule Pune University, Indian Institute of Science Education and Research (IISER), College Technological University, Pune (COEP) Recognize how the mathematical achieve-ments of ancient India, including Vedic mathematics, continue to inspire modern mathematicians and educators.

ACTIVITY(c)	**Multimodal Activities (25 Marks)**	**04 HOURS**

Students are required to perform any one activity as assessment and submit: The activity evaluates students understanding and application of Vedic Mathematics principles. It includes a range of mathematical problems and calculations based on Vedic techniques. Assessment criteria may encompass accuracy, speed, and proficiency in employing Vedic Math methods to problems.

Poster Presentation: Students are required to create a visually appealing and informative poster that summarizes a specific topic or concept related to the course. The poster should effectively convey key points, including information, visuals. Assessment criteria may include content clarity, visual design, organization, and the ability to articulate ideas during the presentation.

Video Documentary: Students are tasked with producing a short video documentary that explores a particular aspect of the course. This assessment component encourages students to research, script, film, and edit a video that presents their chosen topic in a compelling and informative manner. Evaluation criteria may include content accuracy, storytelling, production quality, and overall impact.

Model Making: In this task, students are asked to create a physical model or representation of a concept or object relevant to the course. The model should demonstrate a deep understanding of the subject matter and may include annotations or explanations to clarify its significance. Assessment criteria could include accuracy, creativity, craftsmanship, and the ability to explain the model's relevance.

Product Making: This component challenges students to design and produce a practical product or prototype related to the course content. Students design and craft practical products or prototypes inspired by Indian Knowledge System principles. This hands-on activity fosters creativity and practical application of IKS Students may need to consider materials, functionality, and how their product addresses a real-world problem or application. Evaluation might focus.

TEXT BOOKS

1. Mahadevan B., Pavana N., Bhat Vinayak R.,(2022). *Introduction to Indian Knowledge System: Concepts and Applications.* 1st Edition, PHI Learning. ISBN 978-9391818203.

2. Patil Chaitanya A.,(2018). *Learn Vedic Speed Mathematics Systematically and Step by Step.* 1st Edition, Chaitanya A. Patil Publication. ISBN 9789353008406.

REFERENCE BOOKS

1. Bose, D. M. Sen, S.N. Subbarayappa,B. V. (2010). A Concise History of Science in India. 2nd Edition, Universities Press Publisher, Hyderabad. ISBN 9788173716195.
2. Boyer Carl B., (2011). A History of Mathematics. 3rd Edition. Wiley Publication. ISBN 9780470630563

3. Cooke Roger L. (2011). The History of Mathematics: A Brief Course. 2ND Edition. Wiley Publication. ISBN 9781118030240

MIT | Academy of Engineering	COURSE SYLLABUS	
(An Autonomous Institute Affiliated to Savitribai Phule Pune University)		
SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	W.E.F	**AY:** 2023 - 2024 (Rev. 2022) (NEP)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Indian Knowledge Systems: Vedic Mathematics
	COURSE CODE	2307181
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	25	NIL	50	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2307181.CEO.1: To facilitate the students with the concepts of Indian traditional knowledge

2307181.CEO.2: To make them understand the Importance of roots of knowledge system.

2307181.CEO.3: To encourage students to think creatively and critically about mathematical concepts

2307181.CEO.4: To bring forward the extraordinary work done by Indian Mathematicians in the fields such as Astronomy, Astrology, Geometry, Algebra, and Arithmetic etc.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2307181.CO.1: Explain the history and broad classification of Indian knowledge System [L2].

2307181.CO.2: Outline the features of Indian numeral system and its role in science technology advancement [L2].

2307181.CO.3: Apply key Vedic Mathematics principles by understanding foundational concepts and providing clear insights into the underlying principles and relationships [L3].

2307181.CO.4: Choose suitable Vedic mathematics approaches in solving specific types of problems [L3].

COURSE ABSTRACT:

This course will help learners to know and understand their own systems and traditions which are imperative for any real development and progress. Because of this course learners will think independently and originally with Indian frameworks and models for solving the problems of present day.

Vedic Mathematics will not have direct application in Electronics or E&TC Engineering as a specialized field, however it offers benefits and insights that are relevant in certain context.

It will be used in logic development, signal processing, data analysis and designing of algorithms. Recognizing patterns in numbers and exploiting these patterns to simplify calculation is one of the skill in Vedic Mathematics. This skill can be valuable in dealing with complex wave forms, data patterns, image and signal processing.

Deeper concepts like Fibonnaci series, Linear Algebra, Re-configurable Programming in VLSI, problem solving skills can be considered as applications of Vedic Mathematics in Electronics and E&TC discipline.

THEORY COURSE CONTENTS

UNIT 1	Indian Knowledge System – An Introduction	04 HOURS

Applications/Case Study: Connections between different fields of study and an affection for traditional knowledge

Contents: Introduction and need of IKS; historic importance of IKS; Why do we need IKS; Organization of IKS; Historicity of IKS; Some salient aspects of IKS

Further Readings/Self Study: Linkage of Mathematics and IKS

UNIT 2	Introduction to Indian Mathematics	02 HOURS

Applications/Case Study: Mathematical Innovations in 17th and 18th Century

Contents: Introduction to Indian Mathematics; Unique aspects of Indian Mathematics; Indian Mathematicians and their Contributions

Further Readings/Self Study: Impact of Mathematical Innovations on society

UNIT 3	Deep Insights in to Indian Mathematics	12 HOURS

Applications/Case Study: Basic Sutras and subsutras in Vedic Mathematics

Contents: Arithmetic; Algebra; Geometry; Trigonometry; Binary mathematics and combinational problems in Chandaḥ Śāstra; Magic squares in India

Further Readings/Self Study: application of Chandaḥ Śāstra in designing of algorithms

UNIT 4	Astronomy	04 HOURS

Applications/Case Study: Linear measures of celestial coordinate system.

Contents: Unique Aspects of Indian Astronomy, Historical Development, The Celestial Coordinate System, Elements of the Indian Calendar.

Further Readings/Self Study: Positional Astronomy.

ACTIVITY(a)	Activity Based on IKS (25 Marks)	01 HOUR

Activity based on the IKS will assess student's knowledge and comprehension of the course content. The purpose of the activity is to evaluate the participants' understanding and knowledge of IKS.

ACTIVITY(b)	Field Visit and Report Writing (25 Marks)	08 HOURS

Students are required to conduct a field visit to the local places mentioned below. Upon completion of the field visit, students must write a report on the visit, its analysis, and submit the detail report for assessment

Field Visit Guideline :

Archaeological Sites: Visit archaeological sites like ancient temples and caves (Karla, Bhaja Bedse Caves, old temples) Vedic mathematics emphasizes geometric principles and formulas. These principles may have been applied in the design and construction of ancient temples and caves. These architecture often involves intricate geometric patterns and proportions, which could have been influenced by Vedic mathematical concepts.

Museums: Explore museums that exhibit ancient artifacts, tools, and techniques. (Raja Dinkar Kelkar Museum, Mahatma Phule Museum, Deccan College Museum, Darshan Museum) Observe any mathematical symbols, notations, or representations found in ancient artifacts. These can provide clues about how mathematical concepts were recorded and communicated in ancient times.

Historical Monuments: Visit historical sites featuring iconic artifacts. (Aga Khan Palace, Shaniwar Wada, Sinhgad Fort) Recognize the interdisciplinary nature of Vedic mathematics by understanding its connections to architecture, astronomy, and religious practices. Explore how mathematics played a role in these diverse fields. Appreciate the importance of preserving and conserving archaeological sites that offer insights into Vedic mathematics and ancient knowledge systems.

Educational Institutions: Visit universities or research institutes with metallurgy depart- ments. These institutions often have laboratories and facilities that demonstrate cutting-edge research in Mathematics e.g. Savitribai Phule Pune University, Indian Institute of Science Education and Research (IISER), College Technological University, Pune (COEP) Recognize how the mathematical achieve- ments of ancient India, including Vedic mathematics, continue to inspire modern mathematicians and educators.

ACTIVITY(c)	**Multimodal Activities (25 Marks)**	**04 HOURS**

Students are required to perform any one activity as assessment and submit: The activity evaluates students understanding and application of Vedic Mathematics principles. It includes a range of mathematical problems and calculations based on Vedic techniques. Assessment criteria may encompass accuracy, speed, and proficiency in employing Vedic Math methods to problems.

Poster Presentation: Students are required to create a visually appealing and informative poster that summarizes a specific topic or concept related to the course. The poster should effectively convey key points, including information, visuals. Assessment criteria may include content clarity, visual design, organization, and the ability to articulate ideas during the presentation.

Video Documentary: Students are tasked with producing a short video documentary that explores a particular aspect of the course. This assessment component encourages students to research, script, film, and edit a video that presents their chosen topic in a compelling and informative manner. Evaluation criteria may include content accuracy, storytelling, production quality, and overall impact.

Model Making: In this task, students are asked to create a physical model or representation of a concept or object relevant to the course. The model should demonstrate a deep understanding of the subject matter and may include annotations or explanations to clarify its significance. Assessment criteria could include accuracy, creativity, craftsmanship, and the ability to explain the model's relevance.

Product Making: This component challenges students to design and produce a practical product or prototype related to the course content. Students design and craft practical products or prototypes inspired by Indian Knowledge System principles. This hands-on activity fosters creativity and practical application of IKS Students may need to consider materials, functionality, and how their product addresses a real-world problem or application. Evaluation might focus

TEXT BOOKS

1. Mahadevan B., Pavana N., Bhat Vinayak R.,(2022). *Introduction to Indian Knowledge System: Concepts and Applications.* 1st Edition, PHI Learning. ISBN 978-9391818203.

2. Patil Chaitanya A.,(2018). *Learn Vedic Speed Mathematics Systematically and Step by Step.* 1st Edition, Chaitanya A. Patil Publication. ISBN 9789353008406.

REFERENCE BOOKS

1. Bose, D. M. Sen, S.N. Subbarayappa,B. V. (2010). A Concise History of Science in India. 2nd Edition, Universities Press Publisher, Hyderabad. ISBN 9788173716195.
2. Boyer Carl B., (2011). A History of Mathematics. 3rd Edition. Wiley Publication. ISBN 9780470630563

3. Cooke Roger L. (2011). The History of Mathematics: A Brief Course. 2ND Edition. Wiley Publication. ISBN 9781118030240

SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Indian Knowledge System: Indian Metallurgy
	COURSE CODE	2309181
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	0.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	25	NIL	50	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2309181.CEO.1: To facilitate the students with the concepts of Indian traditional knowledge

2309181.CEO.2: To identify historical evolution in mining and manufacturing process and vedic text related to metallurgy. To express the diverse roles of Indian ironsmith in various domain and observe European perspective on Indian Iron and Steel quality and quantity during the 18th and 19th centuries.

2309181.CEO.3: To explore the comprehensive approach to revive and safeguard metal artifacts through restoration, corrosion management, and innovative preservation techniques.

2309181.CEO.4: To articulate recent trends in metallurgy and advanced materials characterization method.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2309181.CO.1: Explain the background and broad classification of the Indian Knowledge System [L2].

2309181.CO.2: Outline the historical evolution in mining and manufacturing processes related to metallurgy [L2].

2309181.CO.3: Compare the role of ironsmiths and metalworkers in metalworking and European observers' accounts of Indian Iron & Steel quality and quantity [L2].

2309181.CO.4: Demonstrate the approach to revive and safeguard metal artifacts through conservation techniques [L2].

2309181.CO.5: Summarize recent trends and advanced materials characterization methods [L2].

COURSE ABSTRACT:

This course aims to provide an overview on Indian Metallurgy to disseminate the traditional knowledge about Indian Metallurgy and connect to the modern Metallurgy. Course outlines the importance of Indian Knowledge System and its contributions to diverse fields. The historical foundations of Indian metallurgy, covering various aspects from ancient metal mining and manufacturing techniques to the revival and conservation of metal artifacts. Participants will explore the role of metallurgy in shaping societal aspects, the relevance of mining, and the extraction processes for various metal in ancient India. The course will give idea about Indian texts documenting metallurgical knowledge, highlighting Vedic text and traditional metallurgical practices in India, focusing on iron and steelmaking technologies. Participants will gain insights into the vital role of ironsmiths and metalworkers in various domains. European observers' accounts of Indian iron and steel in the 18th and 19th centuries will be examined, shedding light on the high quality and quantity of Indian steel production. The course will touch on European attempts at replication and the subsequent revival of metal artifacts. Strategies for corrosion prevention, restoration, preservation, conservation, and digital documentation. Last part of the course will discuss advances in metallurgy and the challenges faced by the field will be introduced, including responsible and sustainable metal processing practices and the transformation of e-waste and metal waste into valuable resources. The role of nanoscience and nanotechnology in metallurgy included. This course is designed to provide participants with a well-rounded understanding of the historical, technical, and contemporary aspects of Indian metallurgy, equipping them with valuable insights into metal production, conservation, and advancements in the field.

THEORY COURSE CONTENT		
UNIT NO.01	**Indian Knowledge System : An Introduction**	**04 Hours**

Applications/Case Study: A case study on exploring the socio-economic impact of ancient Indian Metallurgy

Contents: Introduction and need of Indian Knowledge System, historic importance of IKS, Organization of IKS; Some salient aspects of IKS.

Further Readings/Self Study: Nataraja, Konark Sun Temple's Wheel (Surya Chakra)(UN Heritage), Vijayanagara Bronze Sculptures, Mysore Palace Durbar Hall

UNIT NO.02	Traditional Metallurgical Practices and European Observation	07 Hours

Applications/Case Study: Application in artistry, aesthetics, sculptures,idols,jewelry,and architectural elements

Contents:

1. Introduction to Indian Metallurgy: Stone Age, Copper Age, Bronze Age, Iron Age and Industrial Age Chronology of human civilization in context of metallurgy

2. Mining and Manufacturing of Zinc, Iron, Copper, Gold etc., in Ancient India: Relevance of mining and metal manufacturing in shaping societal aspects, mineral resources in ancient India, metal extraction processes.

3. Indian Texts Documenting Metallurgical Knowledge and Vedic References to Metals and Metal work- ing: , Vedic metallurgical terminology, major ancient Indian texts related to metallurgy, e.g. "Rasarat- nakara" by Acharya Nagarjuna etc.

4. Iron and Steelmaking technologies in ancient India: e.g. Wootz Steel and Damscus Sword 6.Role and significance of Ironsmiths and metal workers: agriculture, warfare etc.

5.Exploration of Different Metalworking Techniques and Practices: such as forging, alloying, shaping and casting (sand casting, lost-wax casting).

6.European observers' accounts on Indian Iron and Steel in 18th and 19th Century : Indian Steel production, European Attempts at Replication.

Further Readings/Self Study: Indian metals and its value in exchange, Ports and Maritime Routes, Trade and exchange networks and demand for Indian steel on international commerce.

UNIT NO.03	Reviving Metal Artifacts: Corrosion, Restoration, and Conservation	05 Hours

Applications/Case Study: Application of digital documentation and reconstruction in conserving a historic metal artifact

Contents:

1. Resurgence of metal artifacts: restoration, preservation, conservation, digital documentation and reconstruction

2. Types of corrosion : Pitting corrosion, stress corrosion, season cracking etc.

3.Corrosion prevention methods for metal artifacts- use of inhibitors, Cathodic anodic protection, internal external surface coatings methods

Further Readings/Self Study: Cavitation corrosion, erosion corrosion, Low & High temperature corrosion

UNIT NO.04	Advances in Metallurgy and Challenges	06 Hours

Applications/Case Study: Case Study on transforming E-waste precious metals into high-value nano materials for sustainable electronics

Contents:

1.Introduction to recent trends and societal challenges in metallurgy: Toward responsible and sustainable metal processing practices, transforming E-Waste and metal waste into valuable resources

2.Nanoscience and Nanotechnology: Nano materials, synthesis methods- Top down and bottom up approach, Carbon nanotubes and its classification

3.Materials Characterization :Electron Microscopy, Principle of SEM, TEM and XRD

Further Readings/Self Study: Exploring the Circular Economy of Metals: A Comprehensive Study on Sustainable Metallurgical Advances and Nanomaterial Characterization Techniques.

ACTIVITY(a)	Activity based on IKS (25 Marks)	01 Hours

Activity based on the IKS will assess student's knowledge and comprehension of the course content. The purpose of the activity is to evaluate the participants' understanding and knowledge of IKS.

ACTIVITY(b)	Field Visit and Report Writing (25 Marks)	08 Hours

Students are required to conduct a field visit to the local places mentioned below .Upon completion of the field visit, students must write a report on the visit, its analysis, and submit the detail report for assessment **Field Visit Guideline :**

Archaeological Sites: Visit archaeological sites where ancient metallurgical activities took place.(Karla,Bhaja Bedse Caves).

Museums: Explore museums that exhibit ancient metal artifacts, tools, and techniques.(Raja Dinkar Kelkar Museum,Mahatma Phule Museum,Deccan College Museum,Darshan Museum).

Metalwork Workshops: Collaborate with artisans and craftsmen who practice traditional metalworking techniques.

Historical Monuments: Visit historical sites featuring iconic metal artifacts.(Aga Khan Palace,Shaniwar Wada,Sinhagad Fort).

Industrial Facilities: Tour modern metallurgical industries or manufacturing units that produce metal products using advanced techniques.

Educational Institutions: Visit universities or research institutes with metallurgy departments. These institutions often have laboratories and facilities that demonstrate cutting-edge research in metallurgy e.g. Savitribai Phule Pune University, Indian Institute of Science Education and Research (IISER),COEP Technological University, Pune (COEP).

Metal Art Studios: Explore studios of contemporary metal artists, tribal art who use traditional techniques or innovative methods to create metal art, sculptures, and jewelry.(e.g. Devrai Art Vil lage, Panchgani Satara).

Metal Recycling Centers: Gain insights into sustainable metallurgical practices by visiting recycling centers that focus on metal waste management and recycling.

Historical Towns: Consider towns with a historical significance in metallurgy. After completion of field visit student have to write report and filed visit and its analysis and report submission for assessment.

ACTIVITY(c)	Multimodal Activities (25 Marks)	04 Hours

Students are required to perform any one activity as assessment and submit:

Poster Presentation: Students are required to create a visually appealing and informative poster that summarizes a specific topic or concept related to the course. The poster should effectively convey key points, including information, visuals. Assessment criteria may include content clarity, visual design, organization, and the ability to articulate ideas during the presentation.

Video Documentary: Students are tasked with producing a short video documentary that explores a particular aspect of the course. This assessment component encourages students to research, script, film, and edit a video that presents their chosen topic in a compelling and informative manner. Evaluation criteria may include content accuracy, storytelling, production quality, and overall impact.

Model Making: In this task, students are asked to create a physical model or representation of a concept or object relevant to the course. The model should demonstrate a deep understanding of the subject matter and may include annotations or explanations to clarify its significance. Assessment criteria could include accuracy, creativity, craftsmanship, and the ability to explain the model's relevance.

Product Making: This component challenges students to design and produce a practical product or prototype related to the course content. Students design and craft practical products or prototypes inspired by Indian Knowledge System principles. This hands-on activity fosters creativity and practical application of IKS Students may need to consider materials, functionality, and how their product addresses a real-world problem or application. Evaluation might focus on the product's functionality, innovation, craftsmanship, and its alignment with course concepts.

TEXT BOOKS

1. Bose, D. M. Sen, S.N. Subbarayappa,B. V.(2010). *A Concise History of Science in India.* 2nd Edition, Universities Press Publisher, Hyderabad. ISBN 9788173716195.
2. Kodgire,V.D.(2011). *Material Science Metallurgy for Engineers*, Everest Publications. ISBN No-8186314008.
3. Bhargava A.K.(2011). *Mechanical Behavior Testing of Materials*, P H I Learning Private Ltd. ISBN No- 13-9788120342507.

REFERENCE BOOKS

1. Ramachandra Rao, P. and Goswami, N.G. (2001) *Metallurgy in India: A Retrospective*, NML Jamshedpur, ISBN: 8187053567.
2. Avner,S.H.(2014)*Introduction to Physical Metallurgy*, Tata McGraw-Hill.ISBN:13-9780074630068.
3. W. Callister(2013). *Materials Science Engineering*, Wiley Publications.ISBN No:97-88126521432.

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022 (NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Statistics and Integral Calculus
	COURSE CODE	2301103T
	COURSE CREDITS	3
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	TUTORIAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
3	NIL	30	20	50	NIL	NIL	100

PREREQUISITE : NIL

COURSE OBJECTIVES :

2301103T.CEO.1: To extend the basic concepts of integration for evaluation of complex integration problems.

2301103T.CEO.2: To categorize and use equation of curves to trace the given curve.

2301103T.CEO.3: To demonstrate an understanding towards evaluating multiple integrals.

2301103T.CEO.4: To relate and examine the applications of multiple integrals.

2301103T.CEO.5: To study different statistical methods for solving problems.

2301103T.CEO.6: To analyse different probability distribution functions.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301103T.CO.1: Evaluate complex integrals [L3].

2301103T.CO.2: Sketch curves by analysing the given equation of curves [L3].

2301103T.CO.3: Evaluate the multiple integrals [L3].

2301103T.CO.4: Apply the knowledge of multiple integrals to solve engineering problems [L3].

2301103T.CO.5: Assess statistical problems [L4].

2301103T.CO.6: Solve the probability distribution problems [L3].

COURSE ABSTRACT

This course includes some of the main ideas on integral calculus, a wide domain of mathematics that has many applications relevant to the future engineer. Also included different methods of computing integrals and applications of multiple integrals as area, volume, centre of gravity and moment of inertia using different types of examples.Main objective of this course is to identify different methods to evaluate integrals, to demonstrate an understanding towards evaluating multiple integrals, to relate and examine the applications of multiple integrals, to analyze different probability distribution functions, to study different statistical methods for solving problems.It explains the concepts of probability theory and statistics which are needed for handling various real- world problems.As a part of the studies we emphasize more on real life applications of the topics and based on that different activities are also conducting in timely manner. By doing this we inculcate the curiosity of the students towards research.

THEORY COURSE CONTENTS

UNIT 1	Integral Calculus	08 HOURS

Contents: Reduction formulae, Gamma function, Beta function, Differentiation under integral sign.
Self Study: DUIS rule 2

UNIT 2	Curve Tracing and Rectification	07 HOURS

Applications/Case Study: Rose Curves
Contents: Tracing of Curves: Cartesian curves, Parametric curves, Polar curves. Rectification: Rectification of Cartesian, Parametric and Polar curves .
Self Study: Parametric Curves .

UNIT 3	Multiple Integrals	07 HOURS

Contents: Double integration, Evaluation of Double integration, Change of order of Integration, Integration by transforming Cartesian to polar coordinate systems, Triple Integration, Integration by transforming to spherical and cylindrical polar coordinates.
Self Study: Coordinate system.

UNIT 4	Applications of Multiple Integrals	07 HOURS

Contents: Applications of multiple integrals to find Area, Volume, Centre of Gravity, and
Self Study: Moment of Inertia.

UNIT 5	Statistics	08 HOURS

Applications/Case Study: Corona Graph.
Contents: Measures of central tendency, standard deviation, coefficient of variation, moments, skewness and kurtosis, correlation(Karl Pearson's coefficient of correlation) and regression .
Self Study: Measures of Central Tendency,Standard Deviation,Coefficient of Variation

UNIT 6	Probability	08 HOURS

Contents: Probability, probability density function, probability distribution: Binomial, Poisson, Normal.
Self Study: Bayes' Theorem.

TEXT BOOKS

1. Ramana, B. V. (2017). Higher Engineering Mathematics. Tata McGraw-Hill Education.

REFERENCE BOOKS

1. Thomas, G. B., Weir, M. D., Hass, J., & Giordano, F. R. (2002). Thomas' calculus (pp. 2379-8858). Addison-Wesley.
2. Kreyszig, E. (2015). Advanced Engineering Mathematics 10E All Access Pack. John Wiley & Sons.
3. Grewal, B. S., & Grewal, J. S. (2018). Higher engineering mathematics. 2002, Khanna Publishers, New Delhi.
4. Jain, R. K., & Iyengar, S. R. K. (2002). Advanced Engineering Mathematics, Narosa Pub.
5. O'Neil, P. V. (2012). Engineering Mathematics. Foxwell, Birmingham.
6. Zill, D. G., & Wright, W. S. (2011). Engineering Mathematics.
7. Montgomery, D. C., & Runger, G. C. (2010). Applied statistics and probability for engineers. John wiley & sons.
8. Johnson, R. A., Miller, I., & Freund, J. E. (2000). Probability and statistics for engineers (Vol. 2000, p. 642p). London: Pearson Education.

MIT	Academy of Engineering	COURSE SYLLABUS
	(An Autonomous Institute Affiliated to Savitribai Phule Pune University)	

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES		W.E.F	AY: 2023 - 2024 (Rev. 2022 (NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY		COURSE NAME	Statistics and Integral Calculus Tutorial
		COURSE CODE	2301103U
		COURSE CREDITS	1
RELEASE DATE : 01/08/2023		REVISION NO.	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	TUTORIAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	1	NIL	NIL	NIL	20	30	50

PREREQUISITE : NIL

COURSE OBJECTIVES :

2301103U.CEO.1: To extend the basic concepts of integration for evaluation of complex integration problems.

2301103U.CEO.2: To categorize and use equation of curves to trace the given curve.

2301103U.CEO.3: To demonstrate an understanding towards evaluating multiple integrals.

2301103U.CEO.4: To relate and examine the applications of multiple integrals.

2301103U.CEO.5: To study different statistical methods for solving problems.

2301103U.CEO.6: To analyse different probability distribution functions.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301103U.CO.1: Evaluate complex integrals [L3].

2301103U.CO.2: Sketch curves by analysing the given equation of curves [L3].

2301103U.CO.3: Evaluate the multiple integrals [L3].

2301103U.CO.4: Apply the knowledge of multiple integrals to solve engineering problems [L3].

2301103U.CO.5: Assess statistical problems [L4].

2301103U.CO.6: Solve the probability distribution problems [L3].

COURSE ABSTRACT
This course includes some of the main ideas on integral calculus, a wide domain of mathematics that has many applications relevant to the future engineer. Also included different methods of computing integrals and applications of multiple integrals as area, volume, centre of gravity and moment of inertia using different types of examples.Main objective of this course is to identify different methods to evaluate integrals, to demonstrate an understanding towards evaluating multiple integrals, to relate and examine the applications of multiple integrals, to analyze different probability distribution functions, to study different statistical methods for solving problems.It explains the concepts of probability theory and statistics which are needed for handling various real- world problems.As a part of the studies we emphasize more on real life applications of the topics and based on that different activities are also conducting in timely manner. By doing this we inculcate the curiosity of the students towards research.

TUTORIALS		
TUTORIAL NO.01	**Integral Calculus**	**01 HOUR**
Reduction formulae, Gamma function.		
TUTORIAL NO.02	**Integral Calculus**	**01 HOUR**
Beta function, DUIS Rule1 & 2.		
TUTORIAL NO.03	**Curve Tracing**	**01 HOUR**
Tracing of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.04	**Rectification**	**01 HOUR**
Rectification of Cartesian, Polar and Parametric curves.		
TUTORIAL NO.05	**Double Integration**	**01 HOUR**
Double Integration, Evaluation of Double Integration, Change the order of integration, Integration by transforming Cartesian to Polar Coordinate system.		
TUTORIAL NO.06	**Triple Integration**	**01 HOUR**
Triple integration, Integration by transforming to spherical and cylindrical polar coordinates. Application Of multiple integrals: To find Area, Volume.		
TUTORIAL NO.07	**Applications of Multiple Integrals**	**01 HOUR**
Applications of multiple integrals: To find Centre of Gravity of an arc, plane lamina and a solid.		
TUTORIAL NO.08	**Applications of Multiple Integrals**	**01 HOUR**
Applications of multiple integrals: To find Moment of Inertia about an arc, plane and solid.		
TUTORIAL NO.09	**Statistics**	**01 HOUR**
Measures of central tendency, standard deviation, coefficient of variation.		
TUTORIAL NO.10	**Statistics**	**01 HOUR**
Moments, skewness and kurtosis, Correlation and regression.		

TUTORIAL NO.11	**Probability**	**01 HOUR**
Probability, probability density function.		

TUTORIAL NO.12	**Probability**	**01 HOUR**
, Probability distribution: Binomial, Poisson, Normal.		

TUTORIAL NO.13	**Guest Lecture**	**02 HOUR**
Applications of statistics in real life.		

TUTORIAL NO.14	**Doubt Clearing Session**	**01 HOUR**
Unit 1 - Unit 6.		

TEXT BOOKS

1. Ramana, B. V. (2017). Higher Engineering Mathematics. Tata McGraw-Hill Education.

REFERENCE BOOKS

1. Thomas, G. B., Weir, M. D., Hass, J., & Giordano, F. R. (2002). Thomas' calculus (pp. 2379-8858). Addison-Wesley.
2. Kreyszig, E. (2015). Advanced Engineering Mathematics 10E All Access Pack. John Wiley & Sons.
3. Grewal, B. S., & Grewal, J. S. (2018). Higher engineering mathematics. 2002, Khanna Publishers, New Delhi.
4. Jain, R. K., & Iyengar, S. R. K. (2002). Advanced Engineering Mathematics, Narosa Pub.
5. O'Neil, P. V. (2012). Engineering Mathematics. Foxwell, Birmingham.
6. Zill, D. G., & Wright, W. S. (2011). Engineering Mathematics.
7. Montgomery, D. C., & Runger, G. C. (2010). Applied statistics and probability for engineers. John wiley & sons.
8. Johnson, R. A., Miller, I., & Freund, J. E. (2000). Probability and statistics for engineers (Vol. 2000, p. 642p). London: Pearson Education.

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))

FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Engineering Physics
	COURSE CODE	2301102T
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	15	20	40	NIL	NIL	75

COURSE OBJECTIVES :

2301102T.CEO.1: Make students identify the basic concept of measurements and to formulate problems in physical and mathematical terms.

2301102T.CEO.2: Analyze the behavior of light as a wave and get acquaint with different applications in Physics.

2301102T.CEO.3: Classify and understand the difference of classical mechanics and quantum mechanics.

2301102T.CEO.4: Derive the basic laws governing the motion of quantum particles.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301102T.CO.1: Make use of the basics of measurement aspects to obtain acceptable solutions under given conditions [L3].

2301102T.CO.2: Infer theoretical principles of optical phenomenon observed in daily life experience [L4].

2301102T.CO.3: Apply the knowledge of quantum mechanics to study the behavior of quantum particles [L3].

2301102T.CO.4: Analyze the necessity of quantum mechanics in context of failure of classical mechanics [L4].

COURSE ABSTRACT

Since 'technology' has been generally understood as the application of 'science' to find answers to questions confronting us in a wide spectrum of inquiry, so a profound understanding of science is necessary to facilitate building sound intellectual capacity in the area of technology. Various areas of engineering studies are found to be applying concepts discussed in Physics as for instance measurement, optics, quantum-mechanics to name a few which have been instrumental/ pivotal in the development of Engineering branches like Robotics, Mechanical Engineering, Computer Science, Chemical Engineering, Civil Engineering and Electronics and Telecommunications; besides other specific allied areas as Artificial Intelligence, Big-Data Analysis and Quantum Computing. The course of Engineering Physics discusses the basics and analyses the understanding of topics like measurement of physical variables, wave-phenomenon, basics of Quantum Mechanics and its applications thereof. Most of the contents of this course act as a mandatory in terms of extrapolating its further extension to address the basics of Quantum Computing and other such emerging technologies.

THEORY COURSE CONTENTS

UNIT 1	Measurement of Physical Quantities	6 HOURS

Applications/Case Study: Measuring methods in classical mechanics, measuring methods in quantum mechanics.

Contents: Concept of (i)significant numbers, (ii) accuracy versus precision (iii)error versus uncertainty (iv)systematic error versus random error (v) quantifying the uncertainty. Least-count of an apparatus, Methods to measure least-count with specific examples of travelling microscope and spectrometer. importance of estimation and guesstimation in measurement.

Self Study: Span (orders of magnitude) of prominent physical parameters. Length-scale and time-scale of specific physical phenomenon, classical-mechanical-measurement versus quantum-mechanical-measurement.

UNIT 2	Wave Properties of Light	8 HOURS

Applications/Case Study: Coating of lenses as an application of thin film interference.

Contents: Particle nature and wave-nature with examples of wave and particle behavior of light, Introduction to wave nature, Concept of thin film, Stokes law of phase-change on reflection from a thin film, Thin film interference, Interference in films of uniform and non-uniform thickness (with derivation), Newton Ring Experiment, basics of polarization of electromagnetic wave.

Self Study: Superposition Principle, Applications of thin-film interference, Diffraction as a particular case of interference, Application of polarized light.

UNIT 3	Quantum Mechanics-I	8 HOURS

Applications/Case Study: Plank's quantum law of blackbody radiation

Contents: Shortcomings or failure of Classical Mechanics (with specific example of blackbody radiation), Matter-waves, De-Broglie's concept of matter waves, Heisenberg's Uncertainty Principle.

Self Study: Blackbody radiation.

UNIT 4	Quantum Mechanics-II	8 HOURS

Applications/Case Study: Application of electron in a potential well in case of Bohr's atomic model.

Contents: Wave-function, Physical significance of wave function, Schrodinger's equations, Time Dependent and Time Independent forms of Schrodinger Equations, Applications of Schrodinger Equation, Electron in an infinite potential well (rigid box).

Self Study: Electron in a finite deep potential well (non-rigid box).

Further Study: Concept of quantum mechanical tunneling

TEXT BOOKS

1. Feynman R.P., Leighton R.B., Sands M. (2013). The Feynman Lectures on Physics: (Vols.1-3) Narosa Publishing House.
2. Ghatak A. (2016). Optics (6th edition). TMH.

REFERENCE BOOKS

1. Morris A.S. (2001). Measurement and Instrumentation Principles (3rd edition). Butterworth Heinemann.
2. Jenkins & White (2016). Fundamentals of Optics (4th edition). Mc Graw Hill Science.
3. Beiser A., Mahajan S., Choudhary S.R. (2009) Concepts of Modern Physics (6th edition). Mc Graw Hill Education (India) Pvt. Ltd.
4. Schiff L.I., Bandhyopadhyay J. (2017) Quantum Mechanics (4th edition). MH Education (India) Pvt. Ltd.
5. Dirac P.A.M. (2004) Principles of Quantum Mechanics (4th edition). CBS publishers and Distributors 2004.
6. Griffiths D.J. (2016) Introduction to Quantum Mechanics (2nd edition). Cambridge India.

MIT | Academy of Engineering

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COURSE SYLLABUS

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES		**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY		**COURSE NAME**	Engineering Physics Lab
		COURSE CODE	2301102L
		COURSE CREDITS	1
RELEASE DATE : 01/08/2023		**REVISION NO.**	2.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	30	50

COURSE OBJECTIVES :

2301102L.CEO.1: To acquire hands-on experience in setting up and using fundamental physics apparatus.

2301102L.CEO.2: To cultivate students' ability to conduct experiments, analyze data, and draw meaningful conclusions.

2301102L.CEO.3: Encourage students to identify sources of experimental error, and propose improvements.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301102L.CO.1: Demonstrate proficiency in using basic laboratory equipment relevant to physics experiments [L2].

2301102L.CO.2: Interpret the experimental data obtained from measurement of physical variables [L2].

2301102L.CO.3: Develop improved experimental-skills evidenced by their ability to identify sources of errors and propose appropriate precautions [L3].

COURSE ABSTRACT

Since 'technology' has been generally understood as the application of 'science' to find answers to questions confronting us in a wide spectrum of inquiry, so a profound understanding of science is necessary to facilitate building sound intellectual capacity in the area of technology. Various areas of engineering studies are found to be applying concepts discussed in Physics as for instance measurement, optics, quantum-mechanics to name a few which have been instrumental/ pivotal in the development of Engineering branches like Robotics, Mechanical Engineering, Computer Science, Chemical Engineering, Civil Engineering and Electronics and Telecommunications; besides other specific allied areas as Artificial Intelligence, Big-Data Analysis and Quantum Computing. The course of Engineering Physics discusses the basics and analyses the understanding of topics like measurement of physical variables, wave-phenomenon, basics of Quantum Mechanics and its applications thereof. Most of the contents of this course act as a mandatory in terms of extrapolating its further extension to address the basics of Quantum Computing and other such emerging technologies.

PRACTICALS: Seven (7) number of experiments among those listed below to be conducted. Maximum two experiments may be substituted (by faculty in consultation with students) with Experimental hands-on activity/ies among those listed below.

PRACTICAL NO.01	**Interpretation of given data**	**2 HOURS**

Analysis of a given data set in terms of implied uncertainties and tolerance to evaluate validity of a result. (Note: The given data may be in terms of graph as well).

PRACTICAL NO.02	**Estimation and guesstimation**	**2 HOURS**

To predict the expected outcome of a given experimental problem under scientific reasoning justifying the experimental conditions.

PRACTICAL NO.03	**Significant Figures**	**2 HOURS**

Determination of the mass of electron (me) upto specified significant numbers.

PRACTICAL NO.04	**Interference of Light Waves**	**2 HOURS**

Calculate the refractive index of a given liquid using Newton Rings' Experiment.

PRACTICAL NO.05	**Diffraction of Light Waves**	**2 HOURS**

Determination of the line density of a diffraction grating using Laser.

PRACTICAL NO.06	**Interference of Light Waves**	**2 HOURS**

Calculate the wavelength of Sodium light source using Michelson Interferometer.

PRACTICAL NO.07	**Phase and Phase-Difference**	**2 HOURS**

Determination of the phase-difference between two given positions on the path of simple pendulum in periodic motion.

PRACTICAL NO.08	**Polarization**	**2 HOURS**

Determination of the specific rotation of a sugar solution of a given concentration.

PRACTICAL NO.9	Division of Amplitude of Light Waves	2 HOURS
Determination of Radius of Curvature of a given planoconvex lens using Newton's Rings apparatus.		

PRACTICAL NO.10	Diffraction as a Particular Case of Interference	2 HOURS
Calculation of wavelength of different colors using a white light.		

PRACTICAL NO.11	Malus' Law	2 HOURS
Verification of Malus' law under experimental conditions.		

PRACTICAL NO.12	Brewster's Law	2 HOURS
Determination of refractive index of given unknown material.		

Hands-on Activity No.1	Wave/ Quantum mechanics: Effect of measurement on the state of an observable	4 HOURS
Measuring the change in state of an observable using Malus' law under experimental conditions.		

Hands-on Activity No.2	Significant digits in experimental result	2 HOURS
Number of significant digits in the obtained result as a function of different methods used to determine a physical variable/ observable.		

TEXT BOOKS

1. Worsnop B.L., Flint H.T. (2002). Advanced practical Physics for students. Methuen & Co. Ltd. https://archive.org/details/in.ernet.dli.2015.86393/page/n7/mode/2up.
2. Ghatak A. (2021). The ten most beautiful experiments in science. (1st edition). Viva Books.

REFERENCE BOOKS

1. Worsnop B.L., Flint H.T. (2002). Advanced practical Physics for students. Methuen & Co. Ltd. https://archive.org/details/in.ernet.dli.2015.86393/page/n7/mode/2up.
2. Ghatak A. (2021). The ten most beautiful experiments in science. (1st edition). Viva Books.

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev.2022) (NEP)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering
	COURSE CODE	2307101T
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	15	20	40	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2307101T.CEO.1: To impart knowledge of single-phase and three-phase AC circuits.

2307101T.CEO.2: To get acquainted with different electrical machines.

2307101T.CEO.3: To familiarize with blocks of DC power supply and BJT operation.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2307101T.CO.1: Illustrate Single Phase and three phase Systems [L2].

2307101T.CO.2: Identify electrical machines used in typical domestic and industrial Application [L3].

2307101T.CO.3: Construct analog circuits using suitable components [L3].

COURSE ABSTRACT:

This course focuses on developing important technical concepts in a comprehensible, coherent and rigorous way. This comprehensive course provides students with a solid foundation in the principles, theories and practical applications of Electrical and Electronics Engineering. Students will delve into the fundamental concepts of electrical circuits, power analysis, semiconductor devices and digital electronics. Students will also explore the intricate world of semiconductor devices including diodes, transistors, power supply design and uncover their applications in electronic circuits.

THEORY COURSE CONTENT

UNIT 1	Single Phase Electrical Systems	6 HOURS

Contents: Introduction to basic Electrical elements, AC fundamentals, Series and Parallel AC circuits, Power ratings of home appliances (fan, tube light, mixer etc), Study of Electrical connection of house, Fuse, MCBs and grounding for safety at home.

Activity: Energy Consumption calculation for your Home

Self Study: 1.To study Ohms Law, KCL-KVL 2.Use of Basic Electrical Elements in house

UNIT 2	Three Phase Electrical Systems	5 HOURS

Contents: Introduction to Three Phase systems, Delta and Star connections, Relation between line and phase quantities (with Phasor Diagrams), Power in three phase circuits for Star and Delta connections, Introduction to Indian Power system

Activity: Overview of Indian Power Scenario- Flipped Classroom

Self Study: Selections of Star and Delta Connections as per load requirements

UNIT 3	Electrical Machines	06 HOURS

Contents: Single Phase Transformers: Construction, Types, Working Principle, EMF equation, Efficiency
DC Motor: Construction, Working principle, Types of DC Motors, Torque-speed characteristics

Activity: Study of Motors used in Various applications-Mind map

Self Study: Basics of PMDC, BLDC, Stepper motor, Single Phase AC Motors

UNIT 4	Analog Electronics and Power Supply Design	06 HOURS

Contents: Diode, Clipper circuits, Rectifier circuits, DC Regulated power supply, BJT: Construction, Configurations, DC Load Line, Q-point, Switch and Amplifier

Activity: Build and Simulate standard circuit using any Mobile application

Self Study: Study of Clamper Circuit

UNIT 5	Digital Systems	7 HOURS

Contents: Number systems, Logic gates, SOP, K-Map, Combinational circuits: Adder, Subtractor, Mux, Code converter, Sequential circuit: Flip-Flops, Register

Activity: K-Map Puzzle

Self Study:
1- Programmable Logic Devices (PLDs)
2- Digital Circuit Simulators

TEXT BOOKS

1. Edward Hughes (2011) *"Electrical and Electronic Technology"* , 10th edition, Pearson India, ISBN-13: 978-8131733660
2. Thomas L. Floyd (2018) *"Electronics Devices"*, 10th edition, Pearson Education India, ISBN-13: 978-1292222998
3. A. Anand Kumar (2016) *"Fundamentals of Digital Circuits"*, 4th edition, Prentice Hall of India, ISBN-13: 978-8120352681

REFERENCE BOOKS

1. V. N. Mittle and Arvind Mittal (2005). *"Basic Electrical Engineering"*, 2nd edition, McGraw Hill Education, ISBN-13: 978-0070593572
2. D. P. Kothari,I.J.Nagrath (2010). *"Electric Machines"*, 4th edition, McGraw Hill. ISBN: 978-0070699670.
3. Paul Horowitz, Winfield Hill *"The Art of Electronics"*, 3rd edition,Cambridge University press, ISBN: 978-0521809269

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev.2022) (NEP)	
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Electrical & Electronics Engineering Lab	
	COURSE CODE	2307101L	
	COURSE CREDITS	1	
RELEASE DATE : 01/08/2023	**REVISION NO**	2.0	

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	1	NIL	NIL	NIL	20	30	50

PREREQUISITE : NIL

COURSE OBJECTIVES :

2307101T.CEO.1: To relate truth tables and logic expressions for various digital application.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2307101T.CO.1: Build simple digital logic applications [L3].

COURSE ABSTRACT:
The course Electrical and Electronics Engineering combines theory with hands on laboratory experiments where students will have the opportunity to construct and test electronics circuits and work with real world electrical devices.

PRACTICALS		
SESSION NO.1	**Overview in First Session**	**2 HOURS**
a. Three phase voltage generation and its waveform b. General structure of Electrical Power System, three phase 4-wire system (introductory approach) c. Safety measures in electrical system, benefits of energy conservation d. Introduction to DMM, Dimmer stat / Variac, CRO/DSO, Function generator e. Introduction to breadboard and its working		
PRACTICAL NO.1	**R-L-C series A.C. Circuit**	**2 HOURS**
a. To calculate exact values of R, L and C for variations in XL and XC (2 cases) b. To justify the lagging and Leading nature for any two cases		
PRACTICAL NO.2	**Verification of relation between Line and Phase quantities in Star and Delta circuits**	**4 HOURS**
a. To understand Line, Phase quantities and types of connections in Three phase supply b. To connect Bulb load in Star and Delta connection to verify the relation between Line and Phase Quantities **Activity 01: A.C. Circuit Analysis:** To demonstrate concepts like phase, frequency and peak-to-peak voltage on CRO/DSO		
PRACTICAL NO.3	**Open circuit and Short circuit test on a Single-Phase transformer**	**2 HOURS**
a. To find iron losses and no-load circuit parameters b. To find full load copper losses and Equivalent circuit parameters c. To determine efficiency and regulation of transformers at various different loading conditions **Activity 02: Simple DC Motor Model:** a. Build a basic model of DC Motor using coil of wire, a magnet and a battery b. Make the coil to rotate (Apply concept of Magnetic field and current)		

PRACTICAL NO.4	**DC Regulated Power Supply**	**4 HOURS**

a. To design Half and Full Wave Rectifier Circuits by using breadboard

b. To understand 12V/ 9V/ 5V IC based DC regulated power supply (Theoretically) with Datasheets

c. To test and observe waveforms at various stages on CRO and measure the voltage using DMM

PRACTICAL NO.5	**BJT as a switch and Amplifier**	**4 HOURS**

a. BJT as a switch – On/Off the LED at the output by switching BJT

b. BJT as an Amplifier – Measure voltages and observe waveforms at input and output of the single stage CE amplifier

Activity 03: Diode Application: Design Rectifier Circuits (HWR/FWR) on breadboard

PRACTICAL NO.6	**Logic Gates**	**4 HOURS**

To study and verify truth tables of Logic Gates (AND/OR/NAND/NOR)

PRACTICAL NO.7	**Combinational Circuits**	**4 HOURS**

a. To design and implement half adder and Full adder

b. To design and implement Full Adder by dual 4:1 MUX (IC-74LS153) and verify truth table

PRACTICAL NO.8	**Sequential Circuits (Flip Flops)**	**4 HOURS**

To verify Truth table of flip-flops practically using ICs

Activity 04: Boolean Expressions: Implementation and verification of Boolean Expression on breadboard

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TEXT BOOKS

1. Edward Hughes (2011) *"Electrical and Electronic Technology"* , 10th edition, Pearson India, ISBN-13: 978-8131733660
2. Thomas L. Floyd (2018) *"Electronics Devices"*, 10th edition, Pearson Education India, ISBN-13: 978-1292222998
3. A. Anand Kumar (2016) *"Fundamentals of Digital Circuits"*, 4th edition, Prentice Hall of India, ISBN-13: 978-8120352681

REFERENCE BOOKS

1. M. Morris Mano, Michael D. Ciletti *"Digital design"*, 4th edition,Pearson, ISBN: 978-0131989245

(An Autonomous Institute Affiliated to SPPU)	

SCHOOL OF COMPUTER ENGINEERING	**W.E.F**	**AY:** 2024 - 2025 (Rev. 2022 NEP)	
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	DATA VISUALIZATION	
	COURSE CODE	2312162	
	COURSE CREDITS	2	
RELEASE DATE : 01/08/2023	**REVISION NO.**	0.0	

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES.	
2	1	15	20	NIL	20	20	75

COURSE OBJECTIVES :

2304213.CEO.1: To introduce students to the fundamental problems, concepts, and approaches in the design and analysis of data visualization systems

2304213.CEO.2: To familiarize students with the stages of the visualization pipeline, visualization paradigms,techniques, and tools.

2304213.CEO.3: Design effective data visualizations in order to provide new insights and communicate information to the viewer.

2304213.CEO.4: Practice the effectiveness of visualizations for specific data, task, and user types.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2304213.CO.1: Apply Data Exploration, Profiling techniques, cleaning tables on given dataset..

2304213.CO.2: Identify grains for the given domain.

2304213.CO.3: Choose appropriate graphs for given grains.

2304213.CO.4: Construct dashboard and story boards.

COURSE ABSTRACT:

Data Visualization kingpins exploratory presentation of data. Course direct learner to connect with data, grain identification, data management with the help of filters, data visualization with the help of charts, data analysis with the help of table calculations, and at the end dynamic representation concluding the result with the help of dynamic dashboard and story boards.

THEORY COURSE CONTENTS

UNIT 1	DATA EXPLORATION	06 HOURS

Applications/Case Study: North wind dataset
Contents: Data visualization fundamentals, need for data visualization, Data Exploration, Data profiling, Preprocessing tables and data cleaning, Importance dynamic dashboard, Significance amp;applications of each graph illustrate with example. .

UNIT 2	DATA ANALYSIS AND VIEW ENHANCEMENT	05 HOURS

Applications/Case Study: Titanic data set
Contents: table calculations,Format worksheet: Font setting, Border, Line, Format specific setting: Number, Field labels, Annotation: Add and Mark, Positioning, Area, Format, Remove, Labels: Display, Show and hide individual mark label, move label. Descriptive analysis and its co-copyrightResize table: Resize entire table, Rows, columns, Cells.

UNIT 3	DASHBOARD AND STORY BOARD	03 HOURS

Applications/Case Study: Football tournament data set
Contents: Significance and application of each graph, Descriptive analysis and its significance.

PRACTICALS		
PRACTICAL NO.01	**Implement Data connection for the given case study.**	**2 HOURS**
.		
PRACTICAL NO.02	**Identification of grains for any given application/case study e.g Walmart /supermarket for analysis.**	**2 HOURS**
.		
PRACTICAL NO.03	**Concepts and demonstration: Implement data management for enhancing customer experience through** **i) Filter Addition** **ii) Quick Filters** **iii) Global Filters** **iv) Context Filters** **v) Sorting** **vi) Grouping .**	**2 HOURS**
.		
PRACTICAL NO.04	**Concepts and demonstration: Construct View based on the geographical data visualization with the help of** **i) Toolbar** **ii) Dimensions and Measures field** **iii) Folders .**	**2 HOURS**
.		
PRACTICAL NO.05	**Discover basic and advanced view types using** **i) Pie charts** **ii) Stacked bar charts** **iii) Histogram** **iv) Line chart** **v) Area chart** **vi) Scatter plot** **vii) Box and Whisker plot** **viii) Bullet chart** **ix) geographical data charts** **x) geospatial charts** **xi) tree charts** **xii) heat maps** **xiii) pareto charts**	**4 HOURS**
.		

PRACTICAL NO.06	Concepts and demonstration: Table calculations and measures i) Addressing and Partitioning table calculations ii) Quick table calculations iii) Custom table calculations iv) Creation of calculated filed v) calculated measures	4 HOURS
.		
PRACTICAL NO.07	Concepts and demonstration: create a professional dashboard and story boards by applying i) Worksheet Formatting ii) Format specific setting iii) Resize table iv) Copy format to other worksheet etc.	4 HOURS
.		
PRACTICES ANY 2	Concepts and demonstration: create a professional dashboard and story boards on given case study	8 HOURS

REFERENCE BOOKS

1. Sharada Sringeswara; Purvi Tiwari; U. Dinesh Kumar, (2022),"Data Visualization: Storytelling Using Data", Notion press.
2. Dr. Appala Srinuvasu Muttipati, (2023), " Hand Book on Data Visualization: Easy to quick practices", Wiley.
3. Joshua N.Milligan,(2020),"Learning Tableau 2020",Packt

SCHOOL OF COMPUTER ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022 NEP)	
SECOND YEAR BACHELOR OF TECHNOLOGY		**COURSE NAME**	Essentials of Data Science Lab
		COURSE CODE	2304102L
		COURSE CREDITS	1
RELEASE DATE : 01/08/2023		**REVISION NO.**	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES.	
NIL	2	NIL	NIL	NIL	20	30	50

PRE-REQUISITE :

COURSE OBJECTIVES :

2304102L.CEO.1: To get familiar with the basics of Python programming.

2304102L.CEO.2: To learn different data structures in Data Science.

2304102L.CEO.3: To use data computation methods in Data Science.

2304102L.CEO.4: To introduce data manipulation methods in Data Science.

2304102L.CEO.5: To use data visualization methods in Data Science.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2304102L.CO.1: Build a python program for handling syntax and semantics for any given problem[L3].

2304102L.CO.2: Demonstrate proficiency in handling data structures useful in Data Science[L3].

2304102L.CO.3: Apply the suitable methods of data computations on real time data[L3].

2304102L.CO.4: Interpret the different methods of data manipulation on real time data[L3].

2304102L.CO.5: Apply data visualization for real time data to get better insights[L3].

COURSE ABSTRACT

Essentials of Data Science (EDS) is the First Year Semester-II course. This course aims at equipping learners to be able to provide the essence of Data Science by using python programming. In this course, firstly, the learners will learn python fundamentals required for Data Science. The learners are able to use different data organizational structures to store the real time data. Data computations are required to maintain the quality of data. EDS helps to learn different data computations. Data manipulations help in handling missing and noisy values in Data Processing. The learner will learn data storing, loading, cleaning, preparation, wrangling, transformation etc. Data visualization is the practice of translating information into a visual context, such as a map or graph which tends to identify the patterns, trends from the data. This course will increase the learner's interest in Data Science. The activity based learning is adapted to learn this course.

PRACTICAL:Perform following experiments using python programming language.

PRACTICAL NO.01		6 HOURS

Practice Lab Assignments:

1. To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc2 where m is the mass of the object and c is its velocity.

2. Write a Python program for following conditions.

• If n is single digit print square of it.

• If n is two digit print square root of it.

• If n is three digit print cube root of it.

3. Read the birth date and salary in rupees of employees. Perform data transformation for birthdate to age and also salary which is in rupees to salary in dollars using functions.

4. Print the reverse number of a given number,

Lab Assignment:

1. To accept students five courses marks and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course.

If student scores aggregate greater than 75 percentage, then the grade is distinction.

If aggregate is greater than or equal to 60 and less than 75 then the grade if first division.

If aggregate is greater than or equal 50 and less than 60, then the grade is second division.

If aggregate is greater than or equal 40 and less than 50, then the grade is third division.

2. Solve the Fibonacci sequence using recursive function in Python.

3. Write a Python program to print different patterns.

Self Study Assignment:

Perform all statistical analysis (Average, Max, Min, Sum, on emplyoee data.

PRACTICAL NO.02		**6 HOURS**

Practice Lab Assignment:

1. Perform all List Operations, Dictionary Operations.

Lab Assignment:

1. Select the number from the entered list and find its position in Python (use Linear Search).

2. Choose cricket team of eleven players find the captain of the team (consider tallest person as a captain) using dictionary.

Self Study Assignment: 1. Consider the student subjects marks are stored in the list. Find the total marks and percentage of students.

2. Perform all tuple operations.

PRACTICAL NO.03		**6 HOURS**

Practice Lab Assignment:

1. Perform all the Numpy operations in python.

Lab Assignment:

Prepare/Take dataset for any real life application. Read a dataset into an array. Perform following operations on it as:

- Perform all matrix operations
- Horizontal and vertical stacking of Numpy Arrays
- Custom sequence generation
- Arithmetic and Statistical Operations, Mathematical Operations, Bitwise Operators
- Copying and viewing arrays
- Data Stacking, Searching, Sorting, Counting, Broadcasting

Self Study Assignment: For any real life application, perform advanced data operations such as image as array and image manipulations.

PRACTICAL NO.04		**6 HOURS**

Practice Lab Assignment:

1. Perform all the pandas operations in python.

Lab Assignment: Read any real life dataset. Store the data into Data Frames. Identify 10 grains for the given dataset. Implement all 20 grains using Pandas methods. The Sample Grains for Sales Dataset as:

- Which was the best month for sales? How much was earned that month?
- Which product sold the most? Why do you think it did?
- Which city sold the most products?
- What Products are most often sold together?

Self Study Assignment: For any real life application, perform advanced Data Manipulation operations such as combining data, handling time series data.

PRACTICAL NO.05		**6 HOURS**

Practice Lab Assignment:

1. Install MatPlotLib library. Draw basic graphs for sales dataset using MatPlotLib.

Lab Assignment:

For Titanic dataset, Perform data analysis. Identify 5 grains for a given dataset. Perform a data visualization for those grains using the MatPlotLib library. (Use any 5 different graphs with proper title, legends, axis names, etc.to map identified grains)

Self Study Assignment: 1. For any real life application, perform advanced graphs for data visualization such as Span Selector, Broken Barh-Broken Horizontal Bar plot, Watermarking Images with Matplotlib.

2. Apply Linear Regression and K-Nearest Neighbour Classifier on a real time dataset.

TEXT BOOK

1. VanderPlas, J. (2016). Python data science handbook: Essential tools for working with data. " O'Reilly Media, Inc.".
2. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. " O'Reilly Media, Inc.".
3. McKinney, W. (2017). Python for data analysis, " O'Reilly Media, Inc".
4. Brownley, C. W. (2016). Foundations for Analytics with Python: From Non-Programmer to Hacker. " O'Reilly Media, Inc.".

REFERENCE BOOK

1. Mueller, J. P., & Massaron, L. (2019). Python for data science for dummies. John Wiley & Sons.
2. Grus, J. (2019). Data science from scratch: first principles with python. O'Reilly Media.
3. Kane, F. (2017). Hands-on data science and python machine learning. Packt Publishing Ltd.
4. Madhavan, S. (2015). Mastering python for data science. Packt Publishing Ltd.

MIT	Academy of Engineering	COURSE SYLLABUS
	(An Autonomous Institute Affiliated to Savitribai Phule Pune University)	

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	W.E.F	AY: 2023 - 2024 (Rev.2022) (NEP)
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Integrating Sensors and actuators
	COURSE CODE	2306162T
	COURSE CREDITS	1
RELEASE DATE : 01/08/2023	REVISION NO.	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
1	NIL	15	NIL	20	NIL	NIL	35

PREREQUISITE : NIL

COURSE OBJECTIVES :

2306162T.CEO.1: To summarize the knowledge of actuators and sensors.

2306162T.CEO.2: To explain the use of signal conditioning circuitry for sensors.

2306162T.CEO.3: To get acquainted with the role of microcontroller in embedded system.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2306162T.CO.1: Survey different electronics components by forming a group to work in a team for Data Acquisition System. [L4].

2306162T.CO.2: Select Sensors, Actuators and Signal Conditioning Circuit for particular applications [L3].

2306162T.CO.3: Design Data Acquisition System using Sensors, Actuators, Signal Conditioning Circuit and Microcontroller [L3].

2306162T.CO.4: Take part in oral presentation by doing independent study of Datasheets and Data Acquisition System[L4].

COURSE ABSTRACT

The contents of this course involves designing, building, and measuring electronic circuits and projects. This hands-on experience helps students to bridge the gap between theoretical knowledge and practical application, enhancing their problem-solving skills and critical thinking abilities. The skills such as selecting sensors and actuators, designing data acquisition system.

THEORY COURSE CONTENTS

UNIT 1	Sensors	03 HOURS

Applications/Case Study: MEMS technology
Contents: Selection criteria of sensor: Resolution, Sensitivity, Error, Repeatability, Linearity, Accuracy, Zero offset, Power rating.
Self Study: Smart Sensors, Scope of Wearable Devices.

UNIT 2	Signal Conditioning	03 HOURS

Applications/Case Study: Public Address System
Contents: Role of OP-Amp, Opto-Coupler, and Opto isolator in signal conditioning.
Self Study: Study of Multipara-metric (ECG, EEG, EMG) Epidermal Electronics Systems.

UNIT 3	Actuators	03 HOURS

Applications/Case Study: Ball valve actuator technology
Contents: Types and selection of Actuators, linear, rotary, Logical and Continuous Actuators, Electrical Actuation Systems- Solenoids, D.C. Motors, A.C. Motors, Stepper motors.
Self Case-Study: Actuators in IOT.

UNIT 4	Overview of Microcontroller	03 HOURS

Applications/Case Study: Interfacing of ADC
Contents: Selection Criteria for choosing microcontroller.
Self Case-Study: Survey of different families of microcontrollers.

TEXT BOOKS

1. C.S, Rangan, G R Sharma, V S V Mani, (2017), Instrumentation Devices and Systems, Mc Graw Hill.
2. H.S. Kalsi, (2004), Electronic Instrumentation, Tata McGraw Hill Publication.
3. B. C. Nakra, K.K. Choudhury, (2009) "Instrumentation, Measurement and Analysis" 3rd Edition, Tata McGraw.
4. Jacob Fraden, (2010), "Hand Book of Modern Sensors: physics, Designs and Applications", 3rd ed., Springer.
5. Edward Sazonov, Michael R Neuman, (2014), "Wearable Sensors: Fundamentals, Implementation and Applications" Elsevier.

REFERENCE BOOKS

1. Soumitra Kumar Mandal, (2011), *Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 And 8051*, Tata McGraw Hill, India.
2. Jon. S. Wilson, (2005), *Sensor Technology Hand Book*, Elsevier Inc.
3. Murthy, D.V.S., (2003), *Transducers and Instrumentation*, Prentice Hall of India.
4. Shawhney A. K., (1999), *A Course In Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai & Sons, 11th edition.
5. Ramon Pallas-Areny and John G Webster, (2012), *Sensors and Signal Conditioning*, 2nd edition, Wiley India Pvt. Ltd.
6. Doebelin. E.A, (2000), *Measurement Systems - Applications and Design*, Tata McGraw Hill,New York.
7. Patranabis. D, (2000), *Sensors and Transducers*, Prentice Hall of India.
8. John. P, Bentley, (2000), *Principles of Measurement Systems*, 3rd edition, Pearson Education.

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev.2022) (NEP)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Integrating Sensors and actuators Lab
	COURSE CODE	2306162L
	COURSE CREDITS	1
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	20	40

PREREQUISITE : NIL

COURSE OBJECTIVES :

2306162L.CEO.1: To summarize the knowledge of actuators and sensors.

2306162L.CEO.2: To explain the use of signal conditioning circuitry for sensors.

2306162L.CEO.3: To get acquainted with the role of microcontroller in embedded system.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2306162L.CO.1: To make students familiar with the constructions and working principle of different types [L3].

2306162L.CO.2: To make students aware about the Data Acquisition System [L3].

COURSE ABSTRACT

In today's technology-driven world, electronic skills are increasingly important. This proposed course provides students with practical, hands-on experience in working with Sensors, data acquisition system, signal conditioning techniques and actuators. The contents of this course involve designing, building, and measuring electronic circuits and projects. This hands-on experience helps students to bridge the gap between theoretical knowledge and practical application, enhancing their problem-solving skills and critical thinking abilities.

PRACTICALS

PRACTICAL NO.01	Sensors & Signal Conditioning	4 HOURS

Design of signal conditioning circuit for Temperature sensors

- RTD
- Thermocouple

PRACTICAL NO.02	Sensors & Signal Conditioning	4 HOURS

Design of signal conditioning circuit for resistive sensors

- Thermistor

PRACTICAL NO.03	Actuators	6 HOURS

- To demonstrate of Pneumatic trainer board
- To design a pneumatic circuit for "AND" gate logic unit using two pressure valve for single acting cylinder.

PRACTICAL NO.04	GPIO Programming	6 HOURS

- Write a program to demonstrate the LED Blinking using microcontroller
- Write a program to interfacing Relay and Buzzer to the microcontroller.

TEXT BOOKS

1. C.S, Rangan, G R Sharma, V S V Mani, (2017), Instrumentation Devices and Systems, Mc Graw Hill.
2. H.S. Kalsi, (2004), Electronic Instrumentation, Tata McGraw Hill Publication.
3. B. C. Nakra, K.K. Choudhury, (2009) "Instrumentation, Measurement and Analysis" 3rd Edition, Tata McGraw.
4. Jacob Fraden, (2010), "Hand Book of Modern Sensors: physics, Designs and Applications", 3rd ed., Springer.
5. Edward Sazonov, Michael R Neuman, (2014), "Wearable Sensors: Fundamentals, Implementation and Applications" Elsevier. "

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1. Soumitra Kumar Mandal, (2011), *Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 And 8051*, Tata McGraw Hill, India.
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3. Murthy, D.V.S., (2003), *Transducers and Instrumentation*, Prentice Hall of India.
4. Shawhney A. K., (1999), *A Course In Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai & Sons, 11th edition.
5. Ramon Pallas-Areny and John G Webster, (2012), *Sensors and Signal Conditioning*, 2nd edition, Wiley India Pvt. Ltd.
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		COURSE SYLLABUS	

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	W.E.F	AY: 2023 - 2024 (Rev.2022) (NEP)	
FIRST YEAR BACHELOR OF TECHNOLOGY	COURSE NAME	Integrating Sensors and actuators	
	COURSE CODE	2307162T	
	COURSE CREDITS	1	
RELEASE DATE : 01/08/2023	REVISION NO.	2.0	

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
1	NIL	15	NIL	20	NIL	NIL	35

PREREQUISITE : NIL

COURSE OBJECTIVES :

2307162T.CEO.1: To summarize the knowledge of actuators and sensors.

2307162T.CEO.2: To explain the use of signal conditioning circuitry for sensors.

2307162T.CEO.3: To get acquainted with the role of microcontroller in embedded system.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2307162T.CO.1: Survey different electronics components by forming a group to work in a team for Data Acquisition System. [L4].

2307162T.CO.2: Select Sensors, Actuators and Signal Conditioning Circuit for particular applications [L3].

2307162T.CO.3: Design Data Acquisition System using Sensors, Actuators, Signal Conditioning Circuit and Microcontroller [L3].

2307162T.CO.4: Take part in oral presentation by doing independent study of Datasheets and Data Acquisition System[L4].

COURSE ABSTRACT

The contents of this course involves designing, building, and measuring electronic circuits and projects. This hands-on experience helps students to bridge the gap between theoretical knowledge and practical application, enhancing their problem-solving skills and critical thinking abilities. The skills such as selecting sensors and actuators, designing data acquisition system.

THEORY COURSE CONTENTS

UNIT 1	Sensors	03 HOURS

Applications/Case Study: MEMS technology
Contents: Selection criteria of sensor: Resolution, Sensitivity, Error, Repeatability, Linearity, Accuracy, Zero offset, Power rating.
Self Study: Smart Sensors, Scope of Wearable Devices.

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Applications/Case Study: Public Address System
Contents: Role of OP-Amp, Opto-Coupler, and Opto isolator in signal conditioning.
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Contents: Types and selection of Actuators, linear, rotary, Logical and Continuous Actuators, Electrical Actuation Systems- Solenoids, D.C. Motors, A.C. Motors, Stepper motors.
Self Case-Study: Actuators in IOT.

UNIT 4	Overview of Microcontroller	03 HOURS

Applications/Case Study: Interfacing of ADC
Contents: Selection Criteria for choosing microcontroller.
Self Case-Study: Survey of different families of microcontrollers.

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3. B. C. Nakra, K.K. Choudhury, (2009) "Instrumentation, Measurement and Analysis" 3rd Edition, Tata McGraw.
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2. Jon. S. Wilson, (2005), *Sensor Technology Hand Book*, Elsevier Inc.
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4. Shawhney A. K., (1999), *A Course In Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai & Sons, 11th edition.
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6. Doebelin. E.A, (2000), *Measurement Systems - Applications and Design*, Tata McGraw Hill,New York.
7. Patranabis. D, (2000), *Sensors and Transducers*, Prentice Hall of India.
8. John. P, Bentley, (2000), *Principles of Measurement Systems*, 3rd edition, Pearson Education.

MIT | Academy of Engineering (An Autonomous Institute Affiliated to Savitribai Phule Pune University)	COURSE SYLLABUS	
SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev.2022) (NEP)
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Integrating Sensors and actuators Lab
	COURSE CODE	2307162L
	COURSE CREDITS	1
**RELEASE DATE : ** 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	2	NIL	NIL	NIL	20	20	40

PREREQUISITE : NIL

COURSE OBJECTIVES :

2307162L.CEO.1: To summarize the knowledge of actuators and sensors.

2307162L.CEO.2: To explain the use of signal conditioning circuitry for sensors.

2307162L.CEO.3: To get acquainted with the role of microcontroller in embedded system.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2307162L.CO.1: To make students familiar with the constructions and working principle of different types [L3].

2307162L.CO.2: To make students aware about the Data Acquisition System [L3].

COURSE ABSTRACT

In today's technology-driven world, electronic skills are increasingly important. This proposed course provides students with practical, hands-on experience in working with Sensors, data acquisition system, signal conditioning techniques and actuators. The contents of this course involve designing, building, and measuring electronic circuits and projects. This hands-on experience helps students to bridge the gap between theoretical knowledge and practical application, enhancing their problem-solving skills and critical thinking abilities.

PRACTICALS

PRACTICAL NO.01	Sensors & Signal Conditioning	4 HOURS

Design of signal conditioning circuit for Temperature sensors

- RTD
- Thermocouple

PRACTICAL NO.02	Sensors & Signal Conditioning	4 HOURS

Design of signal conditioning circuit for resistive sensors

- Thermistor

PRACTICAL NO.03	Actuators	6 HOURS

- To demonstrate of Pneumatic trainer board
- To design a pneumatic circuit for "AND" gate logic unit using two pressure valve for single acting cylinder.

PRACTICAL NO.04	GPIO Programming	6 HOURS

- Write a program to demonstrate the LED Blinking using microcontroller
- Write a program to interfacing Relay and Buzzer to the microcontroller.

TEXT BOOKS

1. C.S, Rangan, G R Sharma, V S V Mani, (2017), Instrumentation Devices and Systems, Mc Graw Hill.
2. H.S. Kalsi, (2004), Electronic Instrumentation, Tata McGraw Hill Publication.
3. B. C. Nakra, K.K. Choudhury, (2009) "Instrumentation, Measurement and Analysis" 3rd Edition, Tata McGraw.
4. Jacob Fraden, (2010), "Hand Book of Modern Sensors: physics, Designs and Applications", 3rd ed., Springer.
5. Edward Sazonov, Michael R Neuman, (2014), "Wearable Sensors: Fundamentals, Implementation and Applications" Elsevier.

REFERENCE BOOKS

1. Soumitra Kumar Mandal, (2011), *Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 And 8051*, Tata McGraw Hill, India.
2. Jon. S. Wilson, (2005), *Sensor Technology Hand Book*, Elsevier Inc.
3. Murthy, D.V.S., (2003), *Transducers and Instrumentation*, Prentice Hall of India.
4. Shawhney A. K., (1999), *A Course In Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai & Sons, 11th edition.
5. Ramon Pallas-Areny and John G Webster, (2012), *Sensors and Signal Conditioning*, 2nd edition, Wiley India Pvt. Ltd.
6. Doebelin. E.A, (2000), *Measurement Systems - Applications and Design*, Tata McGraw Hill,New York.
7. Patranabis. D, (2000), *Sensors and Transducers*, Prentice Hall of India.
8. John. P, Bentley, (2000), *Principles of Measurement Systems*, 3rd edition, Pearson Education.

COURSE SYLLABUS

SCHOOL OF MECHANICAL ENGINEERING	**W.E.F** **AY:** 2023 - 2024 (Rev. 2022(NEP))

FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Fab Lab
	COURSE CODE	2309162L
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	0.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	4	NIL	NIL	NIL	35	40	75

COURSE OBJECTIVES :

2309162L.CEO.1: Gain proficiency in creating accurate and detailed CAD models of real-life components.

2309162L.CEO.2: Learn how to generate toolpaths using CAM (Computer-Aided Manufacturing) software.

2309162L.CEO.3: Gain confidence in experimenting with different settings and parameters while ensuring safety at all times.

2309162L.CEO.4: Execute fabrication processes accurately and efficiently to produce physical components that meet specified criteria.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2309162L.CO.1: Develop the CAD models for real life components [L3].

2309162L.CO.2: Develop toolpaths for various digital fabrication tools [L3].

2309162L.CO.3: Experiment with digital fabrication tools safely [L3].

2309162L.CO.4: Make use of digital fabrication methods to produce real life components [L4].

PRACTICAL		

Course Abstract:

This course introduces students to the fundamentals of digital fabrication, empowering them to design and create physical objects using a variety of computer-controlled tools and machines. Digital fabrication is changing the way we approach problem-solving and product development. It enables us to transform digital designs into physical objects using cutting-edge tools like laser cutters, and various CNC machine tools. Through hands-on projects and lab sessions, students will learn CAD software, explore digital manufacturing techniques, and gain valuable skills for future engineering and design work.

PRACTICAL NO. 01	**Introduction to Digital Fabrication**	**10 HOURS**

Lab.1: Overview of FAB lab and practical and other details about course forming of groups and Workshop visit and equipment introduction.

Lab.2: Presentation on the following topics and Project Idea Registration

1. History of the Digital Fabrication
2. Significance of Digital Fabrication
3. Basic terminology in the Digital fabrications
4. Safety and Other Protocols to be followed in CAD Lab, Workshop, Industrial Visits
5. Guidelines to work on Design and fabrication projects in groups

Lab.3: Project CAD modelling

Lab.4: Project CAD modelling

Lab.5: Assessment: Project presentation and Report preparation (soft copy)

PRACTICAL NO. 02	**Introduction to Reverse Engineering**	**12 HOURS**

Lab.1: Introduction to Reverse Engineering its capabilities and 3D Scanners and related technology.

Lab.2: Introduction to photogrammetry and demo of how to do reverse engineering with photogrammetry.

Lab.3: 3D Scanning with 3D Scanner

Lab.4: Reverse Engineering of scanned mesh in CAD software and project assignment.

Lab.5: Reverse Engineering of scanned mesh in CAD software and project assignment.

Lab.6: Assessment: Project presentation and Report preparation (soft copy)

PRACTICAL NO. 03	**Introduction to Conventional machining processes**	**14 HOURS**

Lab.1: Introduction to Lathe machines (Operations performed on lathe machines and sequence of operations)

Lab.2: Hands-on Simple Projects on Lathe Machines

Lab.3: Hands-on Simple Projects on Lathe Machines

Lab.4: Introduction to Milling machines (Operations performed on milling machines and sequence of operations)

Lab.5: Hands-on Simple Projects on Milling Machines

Lab.6: Hands-on Simple Projects on Milling Machines

Lab.7: Assessment: Project presentation and Report preparation (soft copy)

PRACTICAL NO. 04	Introduction to CNC Toolpath Programming	12 HOURS

Lab.1: Introduction CNC machines and few renowned CNC manufacturers and Manufacturing Module of Fusion 360 CNC turning toolpath development and simulation

Lab.2: Introduction to G and M codes

Lab.3: CNC Milling toolpath development and simulations.

Lab.4: Project session for development of the toolpath for CNC turning

Lab.5: Project session for development of the toolpath for CNC milling

Lab.6: Assessment: Project presentation and Report preparation (soft copy)

PRACTICAL NO. 05	Introduction to laser cutting and engraving machines	12 HOURS

Lab.1: Introduction to Laser and engraving technology and machines, its applications.

Lab.2: Project ideas Registration for Laser cutting and Engraving (Real life applications) and Training on Laser cutting machines.

Lab.3: CAD models Designing for the projects

Lab.4: Project Handson on laser and engraving machines.

Lab.5: Project Handson on laser and engraving machines.

Lab.6: Assessment: Project presentation and Report preparation (soft copy)

OTHER ACTIVITIES DURING COURSE

1. Guest Lecture On CNC Machines and its Working
2. Guest Lecture on 3D printing Techniques
3. Industrial visit to CNC Machine Shop

REFERENCE BOOK

1. Steen, W. M. (2010). "Laser Material Processing." Springer. ISBN-13: 978-1849961273.
2. Ottaviano, L., & Ascari, A. (2015). "Laser Cutting: A Guide to the Technology." CRC Press. ISBN-13: 978-1482236938.
3. Haynes, John E. (2001) "Introduction to CNC Machining," Industrial Press, ISBN-13: 978-0831131388.
4. Smid, P. (2019) "CNC Programming Handbook," Industrial Press, ISBN-13: 978-0831136291.
5. Wamelen, P. V. (2014) "Reverse Engineering for Beginners," CreateSpace Independent Publishing Platform, ISBN-13: 978-1500772792.
6. Baturone, I., & Barriga, A. (2018) "Reverse Engineering: An Industrial Perspective," CRC Press, ISBN-13: 978-1138114817.

MIT	Academy of Engineering	COURSE SYLLABUS
	(An Autonomous Institute Affiliated to Savitribai Phule Pune University)	

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	W.E.F	**AY:** 2023 - 2024 (Rev.2022) (NEP)	
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Logic Sensing and Actuation	
	COURSE CODE	2306111T	
	COURSE CREDITS	2	
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0	

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	15	20	40	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2306111T.CEO.1: To explain the use of sensors, Actuators, Signal Conditioning Circuits and Microcontrollers for a Data Acquisition Systems.

2306111T.CEO.2: To get acquainted with the role of of sensors, Actuators Signal conditioning Circuits and Microcontrollers in a Data Acquisition.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2306111T.CO.1: Illustrate different types of sensors, Actuators, Signal conditioning Circuits and Microcontrollers for a Data Acquisition Systems [L2].

2306111T.CO.2: Develop a Data Acquisition System for Measurement of Physical Parameters [L3].

2306111T.CO.3: Design a measuring circuit using different sensors and transducers for different physical quantities [L3].

COURSE ABSTRACT

Many opportunities in the field of E&TC engineering, Electrical engineering, Computer engineering, Robotics, IoT (Internet of Things), and even fields like industrial design, require a strong foundation in electronics. The proposed course equips students with the foundational skills needed to excel in these fields. The skills such as selecting sensors and actuators, designing data acquisition system electronic instruments working with components are essential for anyone considering in Electronics or Electronics and Telecommunication Engineering degree which will enhance their analytical skills and persistence in solving complex problems.

THEORY COURSE CONTENTS

UNIT 1	Introduction to Data Acquisition system	04 HOURS

Applications/Case Study: Temperature measurement syste.
Contents: Block Schematic, role of sensor, significance of signal conditioning, actuators and micro-controllers in data acquisition system, concept of feedback.
Self Study: Weather information display system.

UNIT 2	Sensors	06 HOURS

Applications/Case Study: Home Automation system.
Contents: Sensor Vs Transducer Types of sensors: Capacitive sensors,Resistive sensors, Piezoelectric sensors, ultrasonic sensors, IR sensors.
Self Study: Smart Sensors, Scope of Wearable Devices.

UNIT 3	Signal Conditioning	06 HOURS

Applications/Case Study: Obstacle avoiding robot.
Contents: Need of signal conditioning, use of OP-Amp in signal conditioning, basics of ADC and DAC.
Self Study: Study of Wearable Devices.

UNIT 4	Actuators	08 HOURS

Applications/Case Study: Thermal Relay Actuation.
Contents: Concept of Actuation, Types of Actuators-A.C. and D.C. Actuators, Relays,Piezoelectric and Piezoresistive Actuators, Micro Pumps and Micro Actuators.
Self Case-Study: Actuators in IOT applications.

UNIT 5	Introduction to Microcontroller	06 HOURS

Applications/Case Study: Interfacing of ADC
Contents: Concept of Microprocessor and Microcontroller, Selection criteria of Microcontroller, typical architecture of Microcontroller, Functional overview of Microcontroller, Basic programming with Microcontroller.
Self Case-Study: Survey of different families of microcontrollers.

TEXT BOOKS

1. B. C. Nakra, K.K. Choudhury (2009), "Instrumentation, Measurement and Analysis" 3rd Edition, Tata McGraw.
2. Jacob Fraden (2010), "Hand Book of Modern Sensors: physics, Designs and Applications", 3rd ed., Springer.
3. H.S. Kalsi (2004), Electronic Instrumentation, Tata McGraw Hill Publication.
4. C.S, Rangan, G R Sharma, V S V Mani (2017), Instrumentation Devices and Systems, Mc Graw Hill.

REFERENCE BOOKS

1. Soumitra Kumar Mandal (2011), "Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 And 8051", Tata McGraw Hill, India.
2. Jon. S. Wilson (2005), "Sensor Technology Hand Book", Elsevier Inc.
3. D.V.S. Murty (2020), Transducers and Instrumentation, Edition, PHI Publication , Second Edition.
4. Shawhney A. K. (1999), "A Course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai & Sons, 11th Ed.
5. Patranabis. D (1999), "Sensors and Transducers", Prentice Hall of India.
6. John. P, Bentley (2000), "Principles of Measurement Systems", III Edition, Pearson Education. "

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev.2022) (NEP)

FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Logic Sensing and Actuation
	COURSE CODE	2307111T
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			PRACTICAL		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	15	20	40	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2307111T.CEO.1: To explain the use of sensors, Actuators, Signal Conditioning Circuits and Microcontrollers for a Data Acquisition Systems.

2307111T.CEO.2: To get acquainted with the role of of sensors, Actuators Signal conditioning Circuits and Microcontrollers in a Data Acquisition.

COURSE OUTCOMES :

After successful completion of the course, students will be able to,

2307111T.CO.1: Illustrate different types of sensors, Actuators, Signal conditioning Circuits and Microcontrollers for a Data Acquisition Systems [L2].

2307111T.CO.2: Develop a Data Acquisition System for Measurement of Physical Parameters [L3].

2307111T.CO.3: Design a measuring circuit using different sensors and transducers for different physical quantities [L3].

COURSE ABSTRACT

Many opportunities in the field of E&TC engineering, Electrical engineering, Computer engineering, Robotics, IoT (Internet of Things), and even fields like industrial design, require a strong foundation in electronics. The proposed course equips students with the foundational skills needed to excel in these fields. The skills such as selecting sensors and actuators, designing data acquisition system electronic instruments working with components are essential for anyone considering in Electronics or Electronics and Telecommunication Engineering degree which will enhance their analytical skills and persistence in solving complex problems.

THEORY COURSE CONTENTS

UNIT 1	Introduction to Data Acquisition system	04 HOURS

Applications/Case Study: Temperature measurement syste.
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Self Study: Weather information display system.

UNIT 2	Sensors	06 HOURS

Applications/Case Study: Home Automation system.
Contents: Sensor Vs Transducer Types of sensors: Capacitive sensors,Resistive sensors, Piezoelectric sensors, ultrasonic sensors, IR sensors.
Self Study: Smart Sensors, Scope of Wearable Devices.

UNIT 3	Signal Conditioning	06 HOURS

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Self Study: Study of Wearable Devices.

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Applications/Case Study: Thermal Relay Actuation.
Contents: Concept of Actuation, Types of Actuators-A.C. and D.C. Actuators, Relays,Piezoelectric and Piezoresistive Actuators, Micro Pumps and Micro Actuators.
Self Case-Study: Actuators in IOT applications.

UNIT 5	Introduction to Microcontroller	06 HOURS

Applications/Case Study: Interfacing of ADC
Contents: Concept of Microprocessor and Microcontroller, Selection criteria of Microcontroller, typical architecture of Microcontroller, Functional overview of Microcontroller, Basic programming with Microcontroller.
Self Case-Study: Survey of different families of microcontrollers.

TEXT BOOKS

1. B. C. Nakra, K.K. Choudhury (2009), "Instrumentation, Measurement and Analysis" 3rd Edition, Tata McGraw.
2. Jacob Fraden (2010), "Hand Book of Modern Sensors: physics, Designs and Applications", 3rd ed., Springer.
3. H.S. Kalsi (2004), Electronic Instrumentation, Tata McGraw Hill Publication.
4. C.S, Rangan, G R Sharma, V S V Mani (2017), Instrumentation Devices and Systems, Mc Graw Hill.

REFERENCE BOOKS

1. Soumitra Kumar Mandal (2011), "Microprocessors and Microcontrollers Architecture, Programming & Interfacing Using 8085, 8086 And 8051", Tata McGraw Hill, India.
2. Jon. S. Wilson (2005), "Sensor Technology Hand Book", Elsevier Inc.
3. D.V.S. Murty (2020), Transducers and Instrumentation, Edition, PHI Publication , Second Edition.
4. Shawhney A. K. (1999), "A Course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai & Sons, 11th Ed.
5. Patranabis. D (1999), "Sensors and Transducers", Prentice Hall of India.
6. John. P, Bentley (2000), "Principles of Measurement Systems", III Edition, Pearson Education. "

	COURSE SYLLABUS
MIT | Academy of Engineering (An Autonomous Institute Affiliated to Savitribai Phule Pune University) **(An autonomous Institute Affiliated to SPPU)**	
SCHOOL OF MECHANICAL ENGINEERING	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Manufacturing Processes
	COURSE CODE	2309111
	COURSE CREDITS	2
RELEASED DATE : 01/08/2023	**REVISION NO**	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS						
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	15	20	40	NIL	NIL	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

2309111.CEO.1: To explore appropriate manufacturing processes for manufacturing a product.

2309111.CEO.2: To introduce various casting, joining and forming processes.

2309111.CEO.3: To justify the importance of different machining processes for manufacturing various parts.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2309111.CO.1: Identify various casting processes to manufacture a mechanical component [L3].

2309111.CO.2: Apply the appropriate metal forming techniques for producing various mechanical components [L3].

2309111.CO.3: Identify appropriate welding process based on the type of industrial application [L3].

2309111.CO.4: Select appropriate tools and various machining parameters for manufacturing a component [L3].

2309111.CO.5: Examine the broad spectrum of manufacturing applications across diverse industries [L4].

COURSE ABSTRACT:

This course offers a comprehensive introduction to the fundamental principles and practices of manufacturing processes. Manufacturing is the backbone of countless industries, from automotive and aerospace to consumer electronics and healthcare. Understanding the processes that transform raw materials into finished products is essential for any aspiring engineer or technician.

This course takes students on a journey through the world of manufacturing, exploring the various methods, materials, and technologies that underpin the creation of everything from everyday items to cutting-edge innovations. Key areas covered include metalworking,casting, welding, and machining techniques.

THEORY COURSE CONTENT

UNIT 1	Introduction to Manufacturing	5 HOURS

Applications/Case Study: Selection of Manufacturing Process for a Custom Industrial Component.
Contents: Concept of manufacturing, Historical Perspective of Manufacturing, need, scope, advantages, limitation, application, materials and manufacturing, classification of manufacturing, process capabilities, selection of manufacturing processes.
Further Readings/Self Study: Break-even analysis of manufacturing processes.

UNIT 2	Casting Processes	5 HOURS

Applications/Case Study: In-depth examination of real-world casting projects, including challenges faced and solutions implemented.
Contents: Introduction to casting, steps in casting, pattern making, molding, gate and riser design, melt treatment, solidification, sand casting, die casting and permanent mould casting casting defect and their remedy, safety precautions, Introduction to 3D printing.
Further Readings/Self Study: Centrifugal casting, Shell mould casting, Investment casting process.

UNIT 3	Metal Joining Techniques	5 HOURS

Applications/Case Study: Automated MIG welding in industry.
Contents: Introduction, need, principle of fusion welding, gas welding, thermit welding, arc welding processe, TIG welding, MIG welding, friction welding, resistance welding, weldability of metals, solidification of weld, weld discontinuities and their remedy, Riveting, safety precautions.
Further Readings/Self Study: Laser welding, Electron beam welding, Introduction to soldering, brazing and its applications.

UNIT 4	Metal Forming Processes	5 HOURS

Applications/Case Study: Tin Smithing for Model Making: Crafting Miniature Masterpieces.
Contents: Hot and cold forming, rolling, forging, extrusion, drawing, sheet metal forming, press, dies, types of dies and die set, sheet metal operations punching, blanking, notching, safety precautions.
Further Readings/Self Study: Introduction to deep drawing.

UNIT 5	Machining	5 HOURS

Applications/Case Study: Advancements in Machining Processes and Cutting Tool Technologies: Mechanisms and Materials.

Contents: Introduction to machining, types of machine tools - lathe, milling machine, drilling machine, shaping and planing machine, cutting tool, tool material, heat generation, cutting fluid, ,safety precautions.

Further Readings/Self Study: Introduction to boring machine, broaching machine and slotting machine.
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UNIT 6	Grinding Process	5 HOURS

Applications/Case Study: Optimizing Grinding Processes for Enhanced Manufacturing Efficiency.

Contents: Introduction to grinding, choise of abrasives, classification of wheels, grit, bond and grade, grinding operations and grinding machines, safety precautions.

Further Readings/Self Study: Selection of grinding wheel, trueing, balancing and dressing.
.

TEXT BOOK

1. Campbell, J. (2015). Complete casting handbook: metal casting processes, metallurgy, techniques and design. Butterworth-Heinemann.
2. Hu, J., Marciniak, Z.,& Duncan, J. (Eds.). (2002). Mechanics of sheet metal forming. Elsevier.
3. Groover, M. P. (2020). Fundamentals of modern manufacturing: materials, processes, and systems. John Wiley & Sons.
4. Malkin, S., & Guo, C. (2008). Grinding technology: theory and application of machining with abrasives. Industrial Press Inc.

REFERENCE BOOK

1. Ghosh, A., & Mallik, A. K. (1986). Manufacturing science (Vol. 432). Chichester: Ellis Horwood.
2. Rao, P. N. (2018). Manufacturing TechnologyFoundry, Forming and Welding, 5e (Volume 1). McGraw-Hill Education.
3. Chaudhan, S. K. H., & Chaudhan, S. K. H. (1982). Elements of Workshop Technology Vol. II Machine Tools. MPP.
4. Heine, R. W., Loper, C. R., & Rosenthal, P. C. (2005). Principles of Metal Casting, 30th reprint. and, 159, 154.

MIT | Academy of Engineering (An Autonomous Institute Affiliated to Savitribai Phule Pune University)	**COURSE SYLLABUS**

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Communication Skills (English) Lab
	COURSE CODE	2301171L
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO**	2.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	4	NIL	NIL	NIL	35	40	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2301171L.CEO.1: To explain the sounds in English and introduce phonemic transcription.

2301171L.CEO.2: To illustrate the application of fundamental English grammar.

2301171L.CEO.3: To strengthen listening and reading skills with the use of audio and visual aids.

2301171L.CEO.4: To extend the appropriateness of the writing skills in English.

2301171L.CEO.5: To prepare advanced presentations using Canva.

2301171L.CEO.6: To improve communicative competence in English.

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301171L.CO.1: Make use of the sounds of English accurately [L3].

2301171L.CO.2: Apply English grammar rules precisely in practical situations [L3].

2301171L.CO.3: Build vocabulary and listening skills using audio-visual aids [L3].

2301171L.CO.4: Develop syntax and texts in English coherently and formally [L3].

2301171L.CO.5: Utilise Canva to improve presentation skills professionally [L3].

2301171L.CO.6: To enhance communicative competence in English [L3].

COURSE ABSTRACT

The course "Communication Skills: English" primarily focuses on developing communication skills through practical application and utilising language abilities. The objective is to achieve this goal by employing efficient communication and maintaining a constructive demeanour. Students are encouraged to use English as a communication skill to understand speech and body language nuances. This is achieved through activity-based methods and approaches in the language laboratories. The training programme facilitates students' persuasive skills development while fostering improved interpersonal relationships through effective verbal communication. The course enhances students' proficiency and accuracy in communicative competence in English. It enables them to effectively communicate in various contexts, such as society, higher education, and the professional workforce. The course also trains students in using proper practical grammar to enhance effective articulation in English, exploring the primary factors and variables contributing to their difficulties in oral proficiency.

PRACTICALS

PRACTICAL NO.01	**Pronunciation and Phonemic Transcription**	**4 HOURS**
Identification of correct pronunciation of words by decoding phonemic scripts; writing phonemic transcriptions of the given words.		
PRACTICAL NO.02	**Tense and Common Errors**	**6 HOURS**
Use of tenses in day to day communication and academic writing.		
PRACTICAL NO.03	**Listening Skills**	**4 HOURS**
Active listening; Conversations, audio and video clips; Listening with comprehension.		
PRACTICAL NO.04	**Vocabulory Enrichment**	**4 HOURS**
Online exercises on AWL and NAWL using web-based applications; Dictionary Skills and Common errors in grammar while speaking and writing English.		
PRACTICAL NO.05	**Resume, Cover Letter and Email Writing**	**4 HOURS**
How to write an email, characteristics and essentials of a good email, resume, formal letter writing and layout of business letters .		
PRACTICAL NO.06	**Essay Writing**	**4 HOURS**
What is an essay? Tips to write a good essay, Types of essays.		
PRACTICAL NO.07	**Report Writing**	**4 HOURS**
Types of reports, format and writing a report, what is summarizing? Rules of summarizing.		

PRACTICAL NO.08	Presentation Skills-Canva	6 HOURS
Essentials of effective presentations; Data collection and compilation; Preparation of outlines.		

PRACTICAL NO.09	Group Discussions	4 HOURS
Concept of GD, Criteria for evaluation, types of GD – General, Creative and Technical, Dos and Don'ts, Guidelines for participation and success, Group Dynamics, Expression of thoughts and ideas, body language and interpersonal and analytical skills.		

PRACTICAL NO.10	Role Play	4 HOURS
Role-play for verbal communication, team building and group dynamics, decision making, leadership, analytical and creative thinking, group presentation.		

PRACTICAL NO.11	Debate	4 HOURS
Concept, Dos and Don'ts, Guidelines for participation and success, Expression of thoughts and ideas, body language and interpersonal and analytical skills.		

PRACTICAL NO.12	Persuasive Speaking	6 HOURS
Attributes of a good public speaker; prepared and extemporaneous speech; Listening and Reading to famous speeches.		

PRACTICAL NO.13	Reading Comprehension	6 HOURS
Techniques of reading- Intensive, Extensive, Skimming and Scanning; Reading Comprehensions.		

REFERENCE BOOKS

1. Ashok Thorat and Munira Lokhandwala: Enriching Oral and Written Communication in English, ISBN 9788125037446.
2. Swan, M. (2005). Practical english usage (Vol. 688). Oxford: Oxford university press.
3. Dutt et.al. : A Course in Communication Skills, Foundation, 1 edition.
4. Peter Roach: English Phonetics and Phonology, 4th Edition, Cambridge, ISBN-0521149215.
5. Lynch: Listening, Cambridge, 1st edition, ISBN- 0521707757.
6. Malcom Goodale: Professional Presentations, Cambridge, ISBN- 8175962577.
7. Aggarwal, S. (2009). Essential communication skills. Ane Books Pvt Ltd.
8. Jennings: Communication Basics, Cengage Learning, 1st edition, ISBN- 8131515206.

		COURSE SYLLABUS

MIT | Academy of Engineering
(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Communication Skills (German)
	COURSE CODE	2301172T
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	1.0

TEACHING SCHEME (HOURS/WEEK)		EXAMINATION SCHEME AND MARKS					
		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	35	NIL	40	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2301112T.CEO.1: To introduce German language and enhance knowledge, communication and intellectual capabilities.

2301112T.CEO.2: To extend the appropriateness of writing and speaking skills.

2301112T.CEO.3: To develop ability to respond to simple questions in the German language.

2301112T.CEO.4: To acquire basic vocabulary about daily topics.

2301112T.CEO.5: To improve communicative competence in German.

COURSE OUTCOMES:

The students after completion of the course will be able to,

2301112T.CO.1: Apply the foundational aspects of grammar and memorize vocabulary [L3].

2301112T.CO.2: Develop comprehension of low to medium difficulty text and practice speaking about every day basic topics [L3].

2301112T.CO.3: Build the basic communication and comprehension skills for conducting day to day business effectively [L3].

2301112T.CO.4: Make use of simple, familiar expressions to interact with native speakers [L3].

2301112T.CO.5: Develop communicative competence in German language [L3].

COURSE ABSTRACT

The German course not only gives students an excellent grounding in the language, but also opens up fascinating chances to learn more about German culture, history, and literature. Students develop the foundational skills and more advanced strategies necessary to function in a German -speaking culture. A broad variety of linguistic skills, from being able to express oneself properly in writing and speech to being able to understand different forms and talk convincingly in front of an audience of any size, may be honed by learning the language from the bottom up. You may start from scratch with a new language or build on what you already know in this course. Formal education consists of classroom instruction like lectures, seminars, and tutorials. Additionally, students study German through the lens of linked subjects in the fields of history, language, culture, and religion. This German language course is intended for individuals with a high level of linguistic proficiency who want to either deepen their knowledge of the language or begin learning it from scratch.

THEORY COURSE CONTENTS

UNIT 1	Introduction and History	2 HOURS

Contents: Information about Germany, German History, Culture and Language.
Self Study: Historical perspectives of German language .

UNIT 2	Greetings and Introduction	4 HOURS

Contents: Related Vocabulary Alphabets, Numbers, Countries, Languages, Email-Adress, Phone number, Grammar: W-Questions, Simple Sentences, Verb conjugation and personal pronouns like (I, You, He/She/It, We etc.).
Self Study: Word Formation.

UNIT 3	Speaking about hobbys, Making an Appointment, Profile in Internet	4 HOURS

Contents: Numbers (continued), Activity verbs, regular and irregular verbs, Weekdays, Months, Seasons, Professions, Grammar: articles (der, die, das, die) and yes-no-questions.
Self Study: Oral conversation.

UNIT 4	City and Sightseeing	6 HOURS

Contents: Talking about places in a city (railway station, market, bus stop, mall, theatre, cinema hall, museums etc.), Transport (train, bus, plane, tram, metro), Asking for an address or directions, Comprehension: reading city map and events calendar, Grammar: articles in negation (kein, keine, kein, keine), Imperative sentences with you.
Self Study: Regional information in Germany.

UNIT 5	Food	4 HOURS

Contents: Fruits, Vegetables, Drinks, Meals, shops, Grocery shopping, Grammar: Accusative case.
Self Study: Cultural Food in Germany.

UNIT 6	Time	6 HOURS

Applications/Case Study: German Translation.

Contents: Talking about time, asking for time, Making an appointment (part 2), Daily routine, Telephone and email conversations, Grammar: Modalverbs, posessive articles (my, your. . .).

Self Study: Time keeping formats.

UNIT 7	Revision	4 HOURS

Applications/Case Study: German Translation.

Contents: Reading and comprehension, Writing, Listening (optional), Speaking.

TEXT BOOKS

1. Netzwerk Deutsch als Fremdsprache- Kursbuch A1(Stefanie Dengler), Goyal Publications.

REFERENCE BOOKS

1. https://www.klett-sprachen.de , https://www.duolingo.com/

COURSE SYLLABUS

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))

FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Communication Skills (Japanese)
	COURSE CODE	2301173T
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	1.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	35	NIL	40	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2301113T.CEO.1: To introduce Japanese as a foreign language and enhance knowledge, communication and intellectual capabilities which helps to improve cognitive skills and creativity vital for problem solving and innovation.

2301113T.CEO.2: To develop an awareness of Japanese culture along with providing better career opportunities later in life.

2301113T.CEO.3: To develop ability to respond to simple questions in the Japanese language.

2301113T.CEO.4: To acquire basic vocabulary about daily topics in Japanese language.

2301113T.CEO.5: To develop skills related to reading simple sentences and understanding uncomplicated dialogues.

COURSE OUTCOMES:

The students after completion of the course will be able to,

2301113T.CO.1: Develop communication and comprehension skills for conducting day-to-day business effectively

2301113T.CO.2: Understand typical every day and job-related expressions and sentences in the written format.

2301113T.CO.3: Use simple, familiar expressions and produce main ideas of familiar topics when interacting with native speakers or when visiting Japan.

2301113T.CO.4: Develop basic terminology regarding everyday themes in Japanese.

2301113T.CO.5: Hone abilities in reading easy-to-follow words and comprehending straightforward conversations.

COURSE ABSTRACT

Learning Japanese gives students a firm grasps of the language as well as a window into Japanese society, history, and literature. Students acquire both the basic and advanced skills necessary to function effectively in a Japanese-speaking culture. Starting from scratch with a language is the best way to develop fluency in all aspects of communication, from reading and writing to speaking in front of large groups with ease. The course is designed to help students learn a new language and improve their existing skills. To acquire knowledge, students participate in classroom activities such as lectures, seminars, and tutorials. In addition, they study Japan and its culture from a variety of angles, including its history, language, culture, and religion. This course is intended with a high level of linguistic proficiency who wants to either expand their knowledge of Japanese or begin learning it from scratch.

THEORY COURSE CONTENTS

UNIT 1	Introduction	3 HOURS

Contents: Information about Japan, Japanese History, Culture and Language.
Self Study: Japanese Background .

UNIT 2	Greetings, Self Introduction, Japanese Script	6 HOURS

Contents: Self-Introduction- Jikoshoukai, Greeting Words, Hiragana Series, Simple vocabulary in Hiragana.
Self Study: Introduce yourself.

UNIT 3	Understanding Japanese Script	4 HOURS

Contents: Katakana Series, Simple vocabulary in Katakana, Introduction of the concept of time .
Self Study: Japanese script.

UNIT 4	Understanding Simple Sentence Patterns, Time, Prices, Adjectives	5 HOURS

Contents: Basic sentence pattern, Use of demonstrative pronouns, Numbers, Expressing time, Asking for / telling prices, Adjectives.
Self Study: Grammatical Components.

UNIT 5	Date, Verbs, Directions, Binding Sentences	6 HOURS

Contents: Dates, time, frequencies, Verbs in the present and past tense, Coming/Going to, Binding and building longer sentences.
Self Study: Binding sentences.

UNIT 6	Amounts of Time/Money, Distance, Describing Existence, Counters	6 HOURS

Applications/Case Study: German Translation.
Contents: Asking/Telling the amount of time and money, Going from/to, Describing the existence/non-existence of something, Counters.
Self Study: Describing existence.

REFERENCE BOOKS

1. Introduction to Nihongo- Haru 1- Maharashtra State Bureau of Textbook Production and Curriculum Research.
2. Minna No Nihongo-1-1 Japan Foundation.

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)		

SCHOOL OF HUMANITIES AND ENGINEERING SCIENCES	**W.E.F**	**AY:** 2023 - 2024 (Rev. 2022(NEP))
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Communication Skills (French)
	COURSE CODE	2301174T
	COURSE CREDITS	2
RELEASE DATE : 01/08/2023	**REVISION NO.**	0.0

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
2	NIL	35	NIL	40	NIL	NIL	75

PREREQUISITE : NIL

COURSE OBJECTIVES :

2301114T.CEO.1: To introduce French language and enhance knowledge, communication and intellectual capabilities.

2301114T.CEO.2: To extend the appropriateness of writing and speaking skills.

2301114T.CEO.3: To develop ability to respond to simple questions in the French language.

2301114T.CEO.4: To acquire basic vocabulary about daily topics

2301114T.CEO.5: To improve communicative competence in French.

COURSE OUTCOMES:

The students after completion of the course will be able to,

2301114T.CO.1: Apply the foundational aspects of grammar and memorize vocabulary [L3].

2301114T.CO.2: Develop comprehension of low to medium difficulty text and practice speaking about every day basic topics [L3].

2301114T.CO.3: Build the basic communication and comprehension skills for conducting day-to-day business effectively [L3].

2301114T.CO.4: Make use of simple, familiar expressions to interact with native speakers [L3].

2301114T.CO.5: Develop communicative competence in French language [L3].

COURSE ABSTRACT

The French course provides students with a solid foundation in the language and opportunities to delve further into a foreign culture, history, and literature. Students learn the fundamentals and advanced techniques they need to succeed in a society where French language is spoken. Learning the language from the ground up helps hone a wide range of linguistic abilities, from expressing yourself clearly in speaking and writing to comprehending various formats to confidently address an audience of any size. The course provides with the option to learn a language from the ground up or to expand on any prior knowledge of the language. Students learn through formal training, lectures, seminars, and tutorials. In addition, they pursue a curriculum in French studies through related themes in historical, linguistic, cultural, religious, and other settings. The French course is designed for students with advanced language abilities to deepen their mastery of a foreign language or begin studying it from scratch.

THEORY COURSE CONTENTS

UNIT 1	Introduction	5 HOURS

Contents: Vous connaissez la France ? - Introduction.
Self Study: Spoken task -record an audio.

UNIT 2	Presentation and Questioning	5 HOURS

Contents: Autour de moi- Presenting and questioning Nouns.
Self Study: Written task- forming questions and exercises.

UNIT 3	Syntax	5 HOURS

Contents: Le monde- Sentence structure, talking about oneself, countries, cities ,etc.
Self Study: Written task- form sentences about oneself, countries, cities ,etc.

UNIT 4	Speaking and Writing Skills	5 HOURS

Contents: Ma famille- writing and talking about :Family, house and time.
Self Study: Written task- form sentences about one's family and house.

UNIT 5	Writing Task	5 HOURS

Contents: Mes loisirs- writing and talking about :Hobbies.
Self Study: Written task- form sentences using different verbs and talk about one's hobbies.

UNIT 6	Spoken and Written Daily Routine	5 HOURS

Contents: Ma routine- writing and talking about : daily activities, seasons and one's body.
Self Study: Written task- form sentences about one's daily routine and seasons.

TEXT BOOKS

1. Saison 1(unit 1-6)- Didier.

REFERENCE BOOKS

1. Extracts from: Alter Ego 1, En Echanges, Entre jeunes, Apprenons le français.
2. Worksheets.

SCHOOL OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING	W.E.F	**AY:** 2023 - 2024 (Rev. 2022(NEP))	
FIRST YEAR BACHELOR OF TECHNOLOGY	**COURSE NAME**	Creative Technologies Lab	
	COURSE CODE	2301183L	
	COURSE CREDITS	2	
RELEASE DATE : 01/08/2023	**REVISION NO.**	0.0	

TEACHING SCHEME		EXAMINATION SCHEME AND MARKS					
(HOURS/WEEK)		THEORY			LABORATORY		TOTAL
LECTURE	PRACTICAL	IA	MSE	ESE	CA	PRACT/DEMO/PRES	
NIL	4	NIL	NIL	NIL	35	40	75

PRE-REQUISITE : NIL

COURSE OBJECTIVES :

2301183L.CEO.1: Develop insight for Futuristic Technology Development.

2301183L.CEO.2: Become familiar with Digital Technologies like AI, AR, Block chain, Cloud, IOT

2301183L.CEO.3: Explore various developments in Robotics, EV, Drone and AE/CE, ZEB.

2301183L.CEO.4: Build a solution for real life problem based on futuristic technologies

2301183L.CEO.5: Design and Develop a Digital Portfolio using Web Technology

COURSE OUTCOMES :

The students after completion of the course will be able to,

2301183L.CO.1: Articulate the significance of United Nations Organization (UNO) Goals. [L2]

2301183L.CO.2: Develop a Digital Portfolio using Web Technology. [L3]

2301183L.CO.3: Illustrate the use cases of emerging technologies. [L2]

2301183L.CO.4: Develop a Laboratory project based on future technologies in a team. [L3]

COURSE ABSTRACT

This is compulsory course with choice-based modules aims to focus on introduction to the futuristic developing engineering technologies. The students will gain insight to technology development and multidisciplinary industrial environment at introductory level. The students will comprehend different technologies in instructional interaction. They will develop Digital portfolio using Web Technology. The students will have ample choice to select futuristic technology of their interest. In order to experience joyful learning, students will apply chosen futuristic technology for real life problems. Alongside demonstrations and there will be hands on training on chosen futuristic technology. They will develop a laboratory project based on futuristic technologies Like Artificial Intelligence (AI), Block-chain Technology, Electric Vehicles (EV), Internet of Things (IOT), Cloud Computing, Augmented Reality (AR), Robotics and Drones, Zero Energy Building (ZEB) and Affordable and Clean Energy (AE/CE).

PRACTICALS:

Module 1: INSTRUCTIONAL MODULE (16 HOURS) [COMPULSORY]

PRACTICAL NO.01	Sustainable Technology Development	1 HOURS

Need for Technology, Overview of Technology Development. Advanced Technologies by year 2030, UNO Goals, Priorities, Open problems, Sustainable Technology.
Application/Case Study: Zero Hunger (UNO Goals: Sustainable Development Goal 2).

PRACTICAL NO.02	Digital Portfolio	1 HOURS

Significance of digital portfolio, Methods for making effective digital portfolio.
Application/Case Study: Sample Digital portfolios of students and Professionals.

PRACTICAL NO.03	Digital Engineering	7 HOURS

Introduction to Artificial Intelligence & Machine Learning, Types of Learnings. Basics of Big Data, significance of it. Introduction to Internet of things, IoT overview, Concept of Edge Computing, IOT Edge computing solutions. Need and importance of Cyber Security, Aspects of cyber-Security.

PRACTICAL NO.04	Overview of Emerging technologies	7 HOURS

Digital Technology Domain: Introduction to Block-chain technology, Fundamental concepts of Cloud computing, Concept of Augmented Reality and applications.
Industry Automation Domain: Introduction to Robotics and Automation, Robot classification, Robot anatomy, Introduction to Drone, Anatomy of a Customized Drone Technology.
Renewable Energy Domain: Solar, Wind, Biofuels, Energy types of fuel cell. Electrical Vehicle (EV), Overview of different systems in EV, Types, Concept of Zero Energy Building (ZEB), Comparison ZEB and Green building, Net zero site energy use, Net zero site source energy use, Net zero energy emissions, Net zero cost Application

Module 2: WEB TECHNOLOGY MODULE (14 HOURS) [COMPULSORY]		
PRACTICAL NO.01	**Basic HTML**	**4 HOURS**
Web 1.0, 2.0, 3.0, 4.0, Basic html tags, formatting tags, color tags, Div and span tags , Ordered list, Unordered list, Image tags, URL tag, table , Form, Hyperlinks.		
PRACTICAL NO.02	**Cascading Style Sheets-CSS**	**4 HOURS**
Cascading Style Sheets-CSS, Multiple style sheets, Web page Layout and website Designs.		
PRACTICAL NO.03	**Digital Portfolio**	**6 HOURS**
One-page/multi-page portfolio using HTML, Projection of information, Personal information, Projects, Achievements, Contact details etc.		

Module-3 ADVANCED TECHNOLOGY MODULE* (16 HOURS) [CHOICE BASED]		
* Student will select any one module out of Ten		
MODULE NO.3A	**Artificial Intelligence (AI)**	**16 HOURS**
PRACTICAL-1	Introduction to AI	02 HOURS
PRACTICAL-2	Image Processing-Object Recognition	04 HOURS
PRACTICAL-3	Machine Learning- Classification/Prediction	04 HOURS
LAB PROJECT	Lab Project based on AI Application	06 HOURS
MODULE NO.3B	**Block Chain Technology**	**16 HOURS**
PRACTICAL-1	Introduction to Block Chain	02 HOURS
PRACTICAL-2	Development and Deployment of smart contact	04 HOURS
PRACTICAL-3	Creation of contact users	04 HOURS
LAB PROJECT	Lab Project based on Block Chain Technology	06 HOURS
MODULE NO.3C	**Cloud Computing**	**16 HOURS**
PRACTICAL-1	Creation of AWS account, Service models	02 HOURS
PRACTICAL-2	Deployment and configuration management	04 HOURS
PRACTICAL-3	AWS instance on AWS cloud, Deployment of web server	04 HOURS
LAB PROJECT	Lab Project based on Cloud Computing Technology	06 HOURS
MODULE NO.3D	**Augmented Reality**	**16 HOURS**
PRACTICAL-1	Introduction to Augmented Reality	02 HOURS
PRACTICAL-2	Objects, Physics, Light intensity adjustments, Scripts	04 HOURS
PRACTICAL-3	Development of 3D project and building application	04 HOURS
LAB PROJECT	Lab Project based for Augmented Reality	06 HOURS

MODULE NO.3E	Internet of Things (IOT)	16 HOURS
PRACTICAL-1	Hardware and Software Simulation Environment, Sensor and Actuators	02 HOURS
PRACTICAL-2	Switch Networking with WiFi module	04 HOURS
PRACTICAL-3	IoT, Cloud Platforms for IOT	04 HOURS
LAB PROJECT	Lab Project based on IOT	06 HOURS
MODULE NO.3F	Robotics	16 HOURS
PRACTICAL-1	Introduction Components, types components	02 HOURS
PRACTICAL-2	Sensors, Actuators, Controller and Circuit	04 HOURS
PRACTICAL-3	Block code	04 HOURS
LAB PROJECT	Lab Project based Robotics	06 HOURS

MODULE NO.3G	Drone Technology	16 HOURS
PRACTICAL-1	Battery, Motors, BLDC, Power rating, losses	02 HOURS
PRACTICAL-2	Flight controllers, Pixhawk, Mamba Controllers	04 HOURS
PRACTICAL-3	Propellers, Assembly	04 HOURS
PROJECT	Lab Project based on Drone Applications	06 HOURS
MODULE NO.3H	Affordable and Clean Energy	16 HOURS
PRACTICAL-1	Proton Exchange Membrane Fuel cell	02 HOURS
PRACTICAL-2	Microbial Fuel cell	04 HOURS
PRACTICAL-3	Open air cathode type fuel cell for car	04 HOURS
LAB PROJECT	Lab Project for Affordable and Clean Energy	06 HOURS

MODULE NO.3I	Electric Vehicles	16 HOURS
PRACTICAL-1	EV Motors and controllers, Battery pack	02 HOURS
PRACTICAL-2	Assembly and Working of Two-Wheeler EV	04 HOURS
PRACTICAL-3	Field Visit to Charging Station	04 HOURS
LAB PROJECT	Lab Project for Electric vehicles	06 HOURS
MODULE NO.3J	Zero Energy Building	16 HOURS
PRACTICAL-1	Calculation of Carbon Footprint, Greenness	02 HOURS
PRACTICAL-2	Calculation of Electricity bill of Family / Hostel/ College Buildings	04 HOURS
PRACTICAL-3	Build It Green (PPT/ Video Presentation)	04 HOURS
LAB PROJECT	Model Making	06 HOURS

Continuous Assessment (CA) (35 Marks)

1. Activity on Sustainability (05 Marks)

2. Activity on Uno goals (10 Marks)

3. *Certification with Online/Offline/Hybrid Course on Future Skills or Future Technologies (20 Marks)

*Certifications [Compulsory for every student]

1. An Industrial or Academic certification course from Industries Agencies of repute will award 20 Marks.

2. The applicable Certification courses will be announced before the start of semester. The students must register for these courses and complete within the time frame announced.

3. The Institute is having collaborations with different agencies like NASSCOM, IBM, IUCEE etc. The applicable courses will be informed to the students.

Laboratory Assessment (PR): (40 Marks)
Jury (Laboratory Project and Assignment Presentation Exam)

1. Lab Experiments, Continuous Assessment activities as applicable in respective Modules (10 Marks).

2. Model Making, Poster presentation, Technical Article, Blog, Physical System Development (Basic) etc. activities as applicable in respective Modules (15 Marks).

3. Presentation of Digital portfolio- Presentation of all assignments and activities in the portfolio. (Personal Website). (15 Marks).

TEXT BOOKS

1. Solem, J. E. (2012). Programming Computer Vision with Python: Tools and algorithms for analyzing images. " O'Reilly Media, Inc.".
2. Vinod Chandra S.S., Hareendran A. S. (2014) Artificial Intelligence and Machine Learning. Prentice Hall India Learning Private Limited.
3. Hoff, T. (2017) Explain the cloud like I'm 10: Learn the inner-secrets behind Kindle, Netflix, AWS, Apple, Facebook, and Google. United States: Possibility Outpost Inc.
4. Garren A. (2017). AWS: A Beginner's Guide to the Basics of Amazon Webservice.
5. Soni, V. (2022). IOT for beginners: Explore IOT architecture, working principles, IOT devices, and various real IOT projects. Inde (BPB Publications).
6. Ford, M. (2016). Rise of the robots: Technology and the threat of a jobless future. Basic Books.
7. Yasodharan R. (2016). Basics of Robotics: To know all about Robotics. (Online).
8. Davies, B. (2016). In Build a drone: A step-by-step guide to designing, constructing, and flying your very own drone. essay, Skyhorse Publishing.
9. Abell, T. (2017). All about drones (Cutting-Edge Technology). North Star Editions.
10. Sandvik, K. B., & amp; Jumbert, M. G. (2016). The good drone (Emerging Technologies, Ethics and International Affairs). Routledge.
11. Liljequist, B., McLennan, F. (2016). The power of Zero: Learning from the world's leading Net Zero Energy Buildings. Ecotone Publishing.
12. Liu H. (2006). Principles of Fuel Cells. Taylor & Francis.
13. Patel N. (Editor). (2021). Electric Vehicles: Modern Technologies and Trends. Springer.
14. Miles M. (2022). The future in AR (augmented reality) for beginners. Online.

REFERENCE BOOKS

1. UNITED NATIONS. (2021). Technology and innovation report 2021: Catching technological waves . United Nations Publications.
https://unctad.org/system/files/official-document/tir2020_en.pdf.

2. Burrows, M. (2012). Global trends 2030: Alternative worlds. US National Intelligence Council.
https://www.dni.gov/files/documents/GlobalTrends_2030.pdf.

3. Open-source reference examples of digital portfolio.
https://github.com/smaranjitghose/awesome-portfolio-websites   https://www.freecodecamp.org/news/how-to-build-a-developer-portfolio-website/