COURSE BOOK B. TECH. I YEAR

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CURRICULUM STRUCTURE & SYLLABUS

Effective from the Session: 2025-26

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1. Teaching Scheme of (B. Tech. I Year) Department wise

1.1 Computer Science and Engineering (CSE)/Computer Science (CS)

B.Tech (CSE/CS) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L/ CH101L	Semiconductor Physics and Devices / Environmental Chemistry	L	3 2	0 0	0 0	60 40	15 10	75 50	75 50	150 100	3 2
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	BS/ES	Major (Core) / Minor Stream	ASH/ ECE	MA202L/ EC201L	Discrete Structures & Theory of Logic/ Computer Organization & Logic Design	L	3	0	0	60	15	75	75	150	3
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
6	ES	Minor Stream	EEE/ ME	EE112B/ ME101B	Introduction to IoT/ Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	BS/ES	Minor Stream	ASH/ ECE	PH101P/ EC201P	Semiconductor Physics and Devices Lab/ Computer Organization & Logic Design Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	PC	Major (Core)	IT	IT102P	Web Designing	P	0	0	2	-	50	50	-	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
11	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 32 hrs.							**15**	**1**	**16**					**1150**	**23**

B. Tech (CSE/CS) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L/ PH101L	Environmental Chemistry/ Semiconductor Physics and Devices	L	2 3	0 0	0 0	40 60	10 15	50 75	50 75	100 150	2 3
3	ES/BS	Minor Stream/ Major (Core)	ECE/ASH	EC201L/ MA202L	Computer Organization & Logic Design/ Discrete Structures & Theory of Logic	L	3	0	0	60	15	75	75	150	3
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	ES	Minor Stream	ME/ EEE	ME101B /EE112B	Design and Realization/ Introduction to IoT	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
6	ES/BS	Minor Stream	ECE/ASH	EC201P/ PH101P	Computer Organization & Logic Design Lab/ Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
Total Hours : 30 hrs.							**13**	**1**	**16**					**1100**	**22**

***Self Growth will be offered to the students as hobby classes of 2 hours.**

1.2 Information Technology (IT)/ Computer Science and Information Technology (CSIT)

B.Tech (IT/CSIT) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L/ CH101L	Semiconductor Physics and Devices / Environmental Chemistry	L	3 2	0 0	0 0	60 40	15 10	75 50	75 50	150 100	3 2
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	BS/ES	Major (Core) / Minor Stream	ASH/ ECE	MA202L/ EC201L	Discrete Structures & Theory of Logic/ Computer Organization & Logic Design	L	3	0	0	60	15	75	75	150	3
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
6	ES	Minor Stream	EEE/ ME	EE112B/ ME101B	Introduction to IoT/ Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	BS/ES	Minor Stream	ASH/ ECE	PH101P/ EC201P	Semiconductor Physics and Devices Lab/ Computer Organization & Logic Design Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	PC	Major (Core)	IT	IT102P	Web Designing	P	0	0	2	-	50	50	-	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
Total Hours : 30 hrs.							**15**	**1**	**14**					**1150**	**23**

*Self Growth will be offered to the students as hobby classes of 2 hours.

B. Tech (IT/CSIT) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L/ PH101L	Environmental Chemistry/ Semiconductor Physics and Devices	L	2 3	0 0	0 0	40 60	10 15	50 75	50 75	100 150	2 3
3	ES/BS	Minor Stream/ Major (Core)	ECE/ASH	EC201L/ MA202L	Computer Organization & Logic Design/ Discrete Structures & Theory of Logic	L	3	0	0	60	15	75	75	150	3
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	ES	Minor Stream	ME/ EEE	ME101B /EE112B	Design and Realization/ Introduction to IoT	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
6	ES/BS	Minor Stream	ECE/ASH	EC201P/ PH101P	Computer Organization & Logic Design Lab/ Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
10	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 32 hrs.							**13**	**1**	**18**					**1100**	**22**

1.3 Computer Science & Engineering (AI)/ Computer Science & Engineering (AI & ML)

B.Tech (CSE(AI)/CSE(AI&ML)) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L/ CH101L	Semiconductor Physics and Devices / Environmental Chemistry	L	3 2	0 0	0 0	60 40	15 10	75 50	75 50	150 100	3 2
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	BS/ES	Major (Core) / Minor Stream	ASH/ ECE	MA202L/ EC201L	Discrete Structures & Theory of Logic/ Computer Organization & Logic Design	L	3	0	0	60	15	75	75	150	3
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
6	ES	Minor Stream	EEE	EE112B	Introduction to IoT	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	BS/ES	Minor Stream	ASH/ ECE	PH101P/ EC201P	Semiconductor Physics and Devices Lab/ Computer Organization & Logic Design Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	PC	Major (Core)	IT	IT102P	Web Designing	P	0	0	2	-	50	50	-	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
Total Hours : 30 hrs.							**15**	**1**	**14**					**1150**	**23**

***Self Growth will be offered to the students as hobby classes of 2 hours.**

B. Tech (CSE(AI)/CSE(AI&ML)) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L/ PH101L	Environmental Chemistry/ Semiconductor Physics and Devices	L	2 3	0 0	0 0	40 60	10 15	50 75	50 75	100 150	2 3
3	ES/BS	Minor Stream/ Major (Core)	ECE/ASH	EC201L/ MA202L	Computer Organization & Logic Design/ Discrete Structures & Theory of Logic	L	3	0	0	60	15	75	75	150	3
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	ES	Minor Stream	CSE(AIML)	AI101B	Introduction to AI	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
6	ES/BS	Minor Stream	ECE/ASH	EC201P/ PH101P	Computer Organization & Logic Design Lab/ Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
10	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 32 hrs.							**13**	**1**	**18**					**1100**	**22**

1.4 Computer Science and Engineering (Data Science)

B.Tech (CSE-DS) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L	Semiconductor Physics and Devices	L	3	0	0	60	15	75	75	150	3
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	BS	Major (Core)	ASH	MA202L	Discrete Structures & Theory of Logic	L	3	0	0	60	15	75	75	150	3
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
6	ES	Minor Stream	EEE/ ME	EE112B/ ME101B	Introduction to IoT/ Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	BS	Minor Stream	ASH	PH101P	Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	PC	Major (Core)	IT	IT102P	Web Designing	P	0	0	2	-	50	50	-	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
11	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 32 hrs.							**15**	**1**	**16**					**1150**	**23**

B. Tech (CSE-DS) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	ES	Minor Stream	ECE	EC201L	Computer Organization & Logic Design	L	3	0	0	60	15	75	75	150	3
Blended															
3	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
4	ES	Minor Stream	ME/ EEE	ME101B /EE112B	Design and Realization/ Introduction to IoT	B	2	0	2	60	15	75	75	150	3
5	BS	Major (Core)	CS	CS101B	Introduction to Data Science	B	1	0	2	40	10	50	50	100	2
Lab/Practical															
6	ES	Minor Stream	ECE	EC201P	Computer Organization & Logic Design Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
Total Hours : 32 hrs.							**13**	**1**	**18**					**1100**	**22**

***Self Growth will be offered to the students as hobby classes of 2 hours.**

1.5 Computer Science and Engineering (Cyber Security)

B.Tech (CSE-CS) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L/ CH101L	Semiconductor Physics and Devices / Environmental Chemistry	L	3 2	0 0	0 0	60 40	15 10	75 50	75 50	150 100	3 2
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	BS/ES	Major (Core) / Minor Stream	ASH/ ECE	MA202L/ EC201L	Discrete Structures & Theory of Logic/ Computer Organization & Logic Design	L	3	0	0	60	15	75	75	150	3
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
6	ES	Minor Stream	EEE	EE112B	Introduction to IoT	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	BS	Minor Stream	ASH	PH101P	Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	PC	Major (Core)	IT	IT102P	Web Designing	P	0	0	2	-	50	50	-	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
Total Hours : 30 hrs.							**15**	**1**	**14**					**1150**	**23**

***Self Growth will be offered to the students as hobby classes of 2 hours.**

B. Tech (CSE-CS) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L/ PH101L	Environmental Chemistry/ Semiconductor Physics and Devices	L	2 3	0 0	0 0	40 60	10 15	50 75	50 75	100 150	2 3
3	ES/BS	Minor Stream/ Major (Core)	ECE/ASH	EC201L/ MA202L	Computer Organization & Logic Design/ Discrete Structures & Theory of Logic	L	3	0	0	60	15	75	75	150	3
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	PC	Major (Core)	IT	IT106B	Introduction to Cyber Security	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
6	ES	Minor Stream	ECE	EC201P	Computer Organization & Logic Design Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
10	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 32 hrs.							**13**	**1**	**18**					**1100**	**22**

1.6 Mechanical Engineering (ME)

B.Tech (ME) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L	Semiconductor Physics and Devices	L	3	0	0	60	15	75	75	150	3
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	ES	Minor Stream	EEE	EE102L	Explorations in Electrical Engineering	L	2	0	0	40	10	50	50	100	2
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
6	ES	Minor Stream	EEE/ ME	EE112B/ ME101B	Introduction to IoT/ Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	BS	Minor Stream	ASH	PH101P	Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	ES	Minor Stream	EEE	EE102P	Explorations in Electrical Engineering Lab	P	0	0	2	-	25	25	25	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
11	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 31 hrs.							**14**	**1**	**16**					**1100**	**22**

B. Tech (ME) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA104L	Differential Equations & Complex Integration	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L	Environmental Chemistry	L	2	0	0	40	10	50	50	100	2
3	PC	Major (Core)	ME	ME102L	Engineering Mechanics	L	2	0	0	40	10	50	50	100	2
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	ES	Minor Stream	ME/ EEE	ME101B/ EE112B	Design and Realization/Introduction to IoT	B	2	0	2	60	15	75	75	150	3
6	PC	Minor Stream	EEE	EE103B	Emerging Technologies for Engineers	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
Total Hours : 31 hrs.							**14**	**1**	**16**					**1150**	**23**

***Self Growth will be offered to the students as hobby classes of 2 hours.**

1.7 Advanced Mechatronics and Industrial Automation (AM & IA)

B.Tech (AM&IA) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L	Environmental Chemistry	L	2	0	0	40	10	50	50	100	2
3	PC	Major (Core)	ME	ME103L	Fundamentals of Mechatronics and Industrial Automation	L	2	0	0	40	10	50	50	100	2
4	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
5	ES	Minor Stream	EEE	EE102L	Explorations in Electrical Engineering	L	2	0	0	40	10	50	50	100	2
6	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
7	ES	Minor Stream	EEE/ ME	EE112B/ ME101B	Introduction to IoT/ Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	ES	Minor Stream	EEE	EE102P	Explorations in Electrical Engineering Lab	P	0	0	2	-	25	25	25	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
11	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 30 hrs.							**15**	**1**	**14**					**1100**	**22**

B. Tech (AM&IA) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA104L	Differential Equations & Complex Integration	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L	Semiconductor Physics and Devices	L	3	0	0	60	15	75	75	150	3
Blended															
3	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
4	ES	Minor Stream	ME/ EEE	ME101B/ EE112B	Design and Realization/Introduction to IoT	B	2	0	2	60	15	75	75	150	3
5	PC	Minor Stream	EEE	EE103B	Emerging Technologies for Engineers	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
6	BS	Minor Stream	ASH	PH101P	Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
Total Hours : 32 hrs.							**13**	**1**	**18**					**1150**	**23**

***Self Growth will be offered to the students as hobby classes of 2 hours.**

1.8 Electrical and Computer Engineering (ELCE)

B.Tech (ELCE) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L	Semiconductor Physics and Devices	L	3	0	0	60	15	75	75	150	3
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	ES	Minor Stream	EEE	EE102L	Explorations in Electrical Engineering	L	2	0	0	40	10	50	50	100	2
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
6	ES	Minor Stream	EEE/ ME	EE112B/ ME101B	Introduction to IoT/ Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	BS	Minor Stream	ASH	PH101P	Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	ES	Minor Stream	EEE	EE102P	Explorations in Electrical Engineering Lab	P	0	0	2	-	25	25	25	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
Total Hours : 29 hrs.							**14**	**1**	**14**					**1100**	**22**

*Self Growth will be offered to the students as hobby classes of 2 hours.

B. Tech (ELCE) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L	Environmental Chemistry	L	2	0	0	40	10	50	50	100	2
3	ES	Minor Stream	ECE	EC201L	Computer Organization & Logic Design	L	3	0	0	60	15	75	75	150	3
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	ES	Minor Stream	ME/ EEE	ME101B/ EE112B	Design and Realization/ Introduction to IoT	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
6	ES	Minor Stream	ECE	EC201P	Computer Organization & Logic Design Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	PC	Major (Core)	ELCE	EL105P	Computer Aided Electrical Design	P	0	0	2	-	25	25	25	50	1
9	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
10	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
11	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 34 hrs.							**13**	**1**	**20**					**1150**	**23**

1.9 Electrical and Electronics Engineering (EEE)

B.Tech (EEE) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L	Semiconductor Physics and Devices	L	3	0	0	60	15	75	75	150	3
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	ES	Minor Stream	EEE	EE102L	Explorations in Electrical Engineering	L	2	0	0	40	10	50	50	100	2
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
6	ES	Minor Stream	EEE/ ME	EE112B/ ME101B	Introduction to IoT/ Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	BS	Minor Stream	ASH	PH101P	Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
9	ES	Minor Stream	EEE	EE102P	Explorations in Electrical Engineering Lab	P	0	0	2	-	25	25	25	50	1
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
11	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 31 hrs.							**14**	**1**	**16**					**1100**	**22**

B. Tech (EEE) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L	Environmental Chemistry	L	2	0	0	40	10	50	50	100	2
3	PC	Minor Stream	EEE	EE104L	Digital Logic Design	L	2	0	0	40	10	50	50	100	2
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	ES	Minor Stream	ME/ EEE	ME101B/ EE112B	Design and Realization/Introduction to IoT	B	2	0	2	60	15	75	75	150	3
6	PC	Minor Stream	EEE	EE103B	Emerging Technologies for Engineers	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	B	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	B	0	0	2	-	50	50	-	50	1
Total Hours : 31 hrs.							**14**	**1**	**16**					**1150**	**23**

***Self Growth will be offered to the students as hobby classes of 2 hours.**

1.10 Electronics & Communication Engineering (ECE)

B.Tech (ECE) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L	Environmental Chemistry	L	2	0	0	40	10	50	50	100	2
3	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
4	ES	Minor Stream	ECE	EC201L	Computer Organization & Logic Design	L	3	0	0	60	15	75	75	150	3
5	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
6	PC	Major (Core)	ECE	EC202L	Intelligent Health Care Systems	L	1	0	0	40	10	50	-	50	1
Blended															
7	ES	Minor Stream	EEE/ ME	EE112B/ ME101B	Introduction to IoT/ Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
8	ES	Minor Stream	ECE	EC201P	Computer Organization & Logic Design Lab	P	0	0	2	-	25	25	25	50	1
9	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
10	PC	Major (Core)	ECE	EC202P	Intelligent Health Care Systems Lab	P	0	0	2	-	25	25	25	50	1
11	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
12	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 32 hrs.							**15**	**1**	**16**					**1150**	**23**

B. Tech (ECE) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L	Semiconductor Physics and Devices	L	3	0	0	60	15	75	75	150	3
3	ES	Minor Stream	EEE	EE102L	Explorations in Electrical Engineering	L	2	0	0	40	10	50	50	100	2
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	ES	Minor Stream	ME/ EEE	ME101B/ EE112B	Design and Realization/Introduction to IoT	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
6	BS	Minor Stream	ASH	PH101P	Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
8	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
9	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
Total Hours : 30 hrs.							**13**	**1**	**16**	**360**	**215**	**575**	**525**	**1100**	**22**

***Self Growth will be offered to the students as hobby classes of 2 hours.**

1.11 Electronics & Communication Engineering (VLSI Design & Technology)

B.Tech (ECE-VLSI) 1st Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA101L	Calculus for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	CH101L	Environmental Chemistry	L	2	0	0	40	10	50	50	100	2
3	ES	Minor Stream	EEE	EE102L	Explorations in Electrical Engineering	L	2	0	0	40	10	50	50	100	2
4	ES	Minor Stream	IT	IT101L	Programming For Problem Solving	L	3	0	0	60	15	75	75	150	3
5	ES	Minor Stream	ECE	EC201L	Computer Organization & Logic Design	L	3	0	0	60	15	75	75	150	3
6	PW	Value Added Courses for all UG	CSIT	IT103L	Design Thinking	L	1	0	0	-	50	50	-	50	1
Blended															
7	ES	Minor Stream	ME	ME101B	Design and Realization	B	2	0	2	60	15	75	75	150	3
Lab/Practical															
8	ES	Minor Stream	ECE	EC201P	Computer Organization & Logic Design Lab	P	0	0	2	-	25	25	25	50	1
9	ES	Minor Stream	IT	IT101P	Programming For Problem Solving Lab	P	0	0	4	-	50	50	50	100	2
10	HS	Value Added Courses for all UG	ASH	HS101P/ HS1XXP	Communication Skills/ Foreign Language	P	0	0	4	40	10	50	50	100	2
11	MC	Value Added Courses for all UG	ASH	HS164P	Indian Knowledge System	P	0	0	2	-	50	50	-	-	NC
Total Hours : 31 hrs.							**16**	**1**	**14**					**1150**	**23**

B. Tech (ECE-VLSI) 2nd Sem

S No.	Course Category (AICTE)	Course Category (UGC)	BOS	Course Code	Course Name	Type	Academic Learning (AL)			Continuous Internal Examination (CIE)			End Sem Examination (ESE)	Total Marks	Total Credits
							L	T	P	MSE	CA	TOTAL		CIE+ ESE	
1	BS	Major (Core)	ASH	MA103L	Linear Algebra for Engineers	L	3	1	0	80	20	100	100	200	4
2	BS	Minor Stream	ASH	PH101L	Semiconductor Physics and Devices	L	3	0	0	60	15	75	75	150	3
3	ES	Major (Core)	ECE	EC208L	Digital Logic Design using HDL	L	2	0	0	40	10	50	50	100	2
Blended															
4	ES	Minor Stream	CSE	CS201B	Data Structure	B	3	0	2	80	20	100	100	200	4
5	ES	Major (Core)	ECE	EC209B	Basic Electronics Engineering	B	1	0	2	40	10	50	50	100	2
Lab/Practical															
6	BS	Minor Stream	ASH	PH101P	Semiconductor Physics and Devices Lab	P	0	0	2	-	25	25	25	50	1
7	ES	Major (Core)	ECE	EC208P	Digital Logic Design using HDL Lab	P	0	0	2	-	25	25	25	50	1
8	ES	Minor Stream	CSE(AIML)	AI102P	Python for Engineers	P	0	0	4	-	50	50	50	100	2
9	HS	Value Added Courses for all UG	ASH	HS1XXP/ HS101P	Foreign Language / Communication Skills	P	0	0	4	40	10	50	50	100	2
10	PW	Value Added Courses for all UG	CSIT	IT104P	Innovation and Entrepreneurship	P	0	0	2	-	50	50	-	50	1
Total Hours : 31 hrs.							**12**	**1**	**18**					**1100**	**22**

*Self Growth will be offered to the students as hobby classes of 2 hours.

2. Theory Courses Detail Syllabus

Course Code: MA101L	Course Name: Calculus for Engineers	L	T	P	C
		3	1	0	4

Pre-requisite: X+2

Course Objectives:

1. The objective of this course is to familiarize the graduate engineers with techniques of multivariate analysis of real, complex and vector functions in calculus.
2. It aims to impart the knowledge of tools from intermediate to advanced level that will enable them to handle complex problems and its applications so that they would find useful in their disciplines.

Course Outcome: After completion of the course, the student will be able to

1. Apply the concept of partial differentiation in application of homogeneous and composite functions.
2. Apply knowledge of partial differentiation in extrema, series expansion of functions and Jacobians.
3. Apply the concept of vector differentiation in engineering problems.
4. Employ the concept of multiple integration to find the area of bounded region.
5. Apply the concept of analytic and harmonic functions of complex variables in transformation.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	-	-	-	1	-	-	-	2
CO2	2	2	2	-	-	-	-	1	-	-	-	2
CO3	3	2	2	-	-	-	-	1	-	-	-	1
CO4	2	2	2	-	-	-	-	1	-	-	-	1
CO5	2	2	2	-	-	-	-	1	-	-	-	1

Unit 1	Differential Calculus I	09 hours

Introduction of Limits, continuity and differentiability for function of two variables, Partial derivatives, Composite functions, Total derivative, Euler's Theorem for homogeneous functions, Change of Variables (except polar form)

Unit 2	Differential Calculus II	09 hours

Taylor's and Maclaurin expansion for function of two variables, Jacobians, properties of Jacobian (without proof), Hessian Matrix, Maxima & Minima for a function of several variables, Lagrange's Method of multipliers.

Unit 3	Vector differentiation	09 hours

Scalar point function, Vector point function, Gradient of a scalar field, Directional derivatives, Divergence and curl of a vector function and their application to solenoidal and irrotational vectors respectively.

Unit 4	Multiple Integral	09 hours

Evaluation of double integrals, change of order of integration, Change of variable (double -integral). Application of double integrals to find area of a region.

Unit 5	Complex Variable – Differentiation	09 hours

Functions of complex variable, Limit, Continuity and differentiability, Analytic functions, Cauchy- Riemann equations (Cartesian and Polar form), Harmonic function, Conformal mapping, Mobius transformation.

Total Lecture Hours	45 hours

Textbook:

1. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publishing Company Ltd., 2017
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher, 2020.
3. R K. Jain & S R K. Iyenger, Advanced Engineering Mathematics, Narosa Publishing House 2017.

Reference Books:

1. Dan Hamilton, Calculus 1 - Differentiation and Integration, Hamilton Education Guides 2018.
2. Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas' Calculus, Pearson, 2002.
3. Peter V. O'Neil, Advanced Engineering Mathematics, Thomson (Cengage) Learning, 2007.
4. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2015.

Mode of Evaluation

Evaluation Scheme						
MSE		CA			ESE	Total Marks
MSE 1	MSE 2	CA1	CA2	CA3(ATT)		
40	40	8	8	4	100	200
80		20				

Course Code: PH101L	Course Name: Semiconductor Physics and Devices	L	T	P	C
		3	0	0	3

Pre-requisite: NA

Course Objectives:

To impart the technical aspect of semiconductor Physics and devices to engineering graduates so that they are able to assess and contribute to the solution of technical and engineering problems that are based on broad principles of Physics including solid state physics, semiconductors, optoelectronics devices and Quantum Physics.

Course Outcome: After completion of the course, the student will be able to

1. Illustrate the basic concept of crystalline materials and their appropriate use.
2. Apply the fundamentals of basic semiconductor Physics on transistor and MOSFET.
3. Apply the concepts of semiconductor Physics in aspect of solar cell and Zener diode.
4. Implementing of semiconductor Physics to study various characteristics of optoelectronic devices.
5. Apply the concept of Quantum Physics to study various phenomenon.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	2	2	-	-	2	-	1
CO2	3	2	-	-	-	2	2	-	-	2	-	1
CO3	3	2	-	-	-	2	2	-	-	2	-	1
CO4	3	2	-	-	-	2	2	-	-	2	-	1
CO5	2	1	-	-	-	-	-	-	-	1	-	1

Unit 1	Crystal Structures	09 hours

Distinction between crystalline, Polycrystalline, and Amorphous materials, Space lattice, basis, Unit cell, Lattice parameter, Seven crystal systems and Fourteen Bravais lattices, Diamond crystal structure, Packing factor (cubic, body and face), Lattice planes and Miller Indices, Bragg's law.

Unit 2	Semiconductors and Its Devices	09 hours

Band Theory of Solids, Fermi-Dirac distribution, Free carrier density (electrons and holes), Conductivity of semiconductors, Fermi level in intrinsic and extrinsic semiconductors, Bipolar junction transistor, p-n-p and n-p-n transistors, Introduction of FET and MOSFET, I-V characteristics.

Unit 3	Application of Semiconducting Devices	09 hours

Solar Cell: Photovoltaic effect, Construction and working of solar cell, I-V characteristics of solar cell, Conversion efficiency, Fill factor, Applications of solar cells.
Photodetectors: Principle of photodetector, Construction and working of photodiode and PIN diode, Applications of photodetectors.

Unit 4	Optoelectronic Devices	09 hours

Light Emitting Diode (LED): Direct and indirect band gap semiconductors, Electron-hole pair generation and recombination, Non-radiative and radiative recombination in semiconductors, Differences between homo and hetero junction LEDs, Construction and working of homo junction LED, Characteristics, quantum efficiency, advantages, and applications of LED.

Unit 5	Quantum Mechanics	09 hours

Inadequacy of classical mechanics, Planck's theory of black body radiation (qualitative), de-Broglie concept of matter waves, Heisenberg's uncertainty principle, Phase velocity and group velocity, Time-dependent and time-independent Schrodinger wave equations, Physical interpretation of wave function, Particle in a one- Dimensional box.

Total Lecture Hours	45 hours

Textbook:

1. Donald A. Neamen, Semiconductor Physics and Devices, 4th Edition, Mc Graw Hill Education, 2012.
2. Charles Kittel, Introduction to Solid State Physics, 8thEdition, Wiley, 2013.
3. S.O. Kasap, Optoelectronic and Photonics: Principles and Practices, 2nd Edition, Pearson, 2012
4. S.M. Sze, Semiconductor Physics and Devices, 3rdEdition,Wiley, 2021
5. S.O. Pillai, Solid State Physics, 10th Edition, New Age International Publishers, 2022

Reference Books:

1. V.K. Mehta, Principle of Electronics, 12th Edition, S. Chand, 2020
2. Ben G. Streetman, Solid State Electronic Devices, 7th Edition, Pearson, 2015

Mode of Evaluation

Evaluation Scheme			
MSE	CA	ESE	Total Marks

MSE 1	MSE 2	CA1	CA2	CA3(ATT)		
30	30	6	6	3	75	150
60		15				

Course Code: CH101L	Course Name: Environmental Chemistry	L	T	P	C
		2	0	0	2

Pre-requisite: X+2

Course Objectives:

The objective of this course is to impart the technical aspect of Chemistry and Environment Sciences to engineering graduates so that they are able to assess and contribute to the solution of technical and engineering problems that are based on broad principles of Chemistry and Environment Sciences.

Course Outcome: After completion of the course, the student will be able to

1. Apply the knowledge of advanced materials for interdisciplinary applications.
2. Employ the concept of electrochemistry for portable energy devices to provide viable solutions for industrial problems.
3. Apply the insight of environment and resources for sustainable development.
4. Determine the environment related issues, their impacts and provide the sustainable solutions.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	-	1	1	-	-	-	-	1
CO2	2	2	1	2	-	1	1	-	-	-	-	1
CO3	2	2	1	1	-	2	2	-	-	-	-	2
CO4	2	2	1	1	-	2	2	-	-	-	-	2

Unit 1	Advanced Materials for Smart Devices	07 hours

Chemical bonding, Advanced Materials structure, properties and their applications: Chromo active materials (Liquid crystals), Nanomaterials, Polymeric Materials-PANI and PEDOT in sensors, PMMA in smart devices, Sustainable polymers (PLA, PGA, PHBV), Leaching of Micro-plastics.

Unit 2	Eco-friendly Portable Energy Convertible Devices	08 hours

Introduction to Electrochemistry, Galvanic Cell, Green Batteries and their applications.
Photovoltaic cell: Production of solar grade silicon and its properties, doping of silicon, Dye sensitized solar cells.
Green Fuel cell: Methanol-Oxygen fuel cell, Hydrogen-based fuel cell to decarbonize the global energy, storage and its applications.

Unit 3	Environmental Systems: The Chemistry of Air, Soil, and Water	08 hours

Environmental segments: Composition and segments of Atmosphere
Air pollution: Introduction, major sources of air pollution, air pollutants, Effect of pollutants on humans, materials and vegetation.
Greenhouse effect and global warming: El Nino and La Nina phenomenon.
Ozone layer: Creation, mechanism of depletion and its effect. Smog: Sulphureous and photochemical smog, formation mechanism, and its control.
Water pollution: Properties of water, water Pollution Sources, water treatment and purification technologies
Soil pollution: Origin and nature of soil, sources of soil pollution. soil pollution and plant growth, soil remediation techniques

Unit 4	Environmental Toxicology & Waste management	07 hours

Toxicants: Types and sources of environmental toxicants, physiological response to toxicants (Mutagenesis, Carcinogenesis, Teratogenesis), Case Studies of Toxic Events and Responses
Waste management: Types of waste (e.g, municipal solid waste, hazardous waste, industrial waste, e-waste, biomedical waste), Waste Management Strategies (e.g., recycling, treatment, disposal), Remediation Technologies (bioremediation), Environmental Policies and Regulations
Sustainable Development: Concepts and definition,17 SDGs with a focus on relevant goals, SDG Goals by 2030 (Principles, challenges, global initiative and policies)

Total Lecture Hours	30 hours

Textbook:

1. Rajaram J., Kuriacose J. C.,"Chemistry in Engineering and Technology", Vol.1, Tata McGraw-Hill, India, 2018.

2. Fahlman B. D., "Materials Chemistry", Germany, Springer Netherlands, 2018.
3. Deswal S., "Environmental Studies" Dhanpat Rai & Co., 2012.

Reference Books:

1. Hwang N.M., "Non-Classical Crystallization of Thin Films and Nanostructures in CVD and PVD Processes" Springer, Netherland, 2016.
2. Billmayer F.W., "Textbook of Polymer Science", 3rd Ed. Wiley, 2007.
3. Rajgopalan R. "Environmental Studies" Ed. III, Oxford University Press, 2016.

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
20	20	4	4	2	**50**	**100**
40		**10**				

Course Code: IT101L	**Course Name: Programming for Problem Solving**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Pre-requisite: Computer block diagram, Generation of programming languages, Translators, Flowchart

Course Objectives:

1. Given a computational problem, identify and abstract the programming task involved.
2. Approach the programming tasks using techniques learned and writepseudo-code.
3. Choosethe right data representation formats based on the requirements of the problem.
4. Use comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
5. By learning the basic programming constructs, students can easily switch over to any other language in future.

Course Outcome: After completion of the course, the student will be able to

1. Apply programming constructs of C language to solve real-world problems.
2. Use the concepts of looping, branching, and decision-making statements for a given problem.
3. Develop Solutions to problems using modular programming constructs such as functions and recursion.
4. Demonstrate the ability to write C programs using pointers, strings structures and unions.
5. Design a solution to problems using the concepts of pointers and files handling.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	2	-	-	1	-	-	-	2
CO2	3	3	-	2	2	-	-	1	-	-	-	2
CO3	3	3	-	2	2	-	-	1	-	-	-	2
CO4	3	3	2	2	2	-	-	1	-	-	-	2
CO5	3	3	2	2	2	-	-	1	-	-	-	2

Unit 1	**Introduction**	**09 hours**

Introduction: Algorithm, Structure of C program, Writing the first C program, Compilation and execution process. Tokens: Keywords, Identifier, Variables, Constants, Strings, Character set.
Operators: Arithmetic, Relational, Equality, logical, Unary, Conditional, Bitwise, Comma, Operator precedence and associativity, type conversion, and type casting.
Best Practices in Code writing: Naming Conventions and Importance of Comments to enhance the readability of the program.

Unit 2	**Decision Control and Looping Statements**	**09 hours**

Decision Statements: Conditional Branching statements: if, if-else, if-else-if, switch case.
Iterative statements: while, do-while, for loop and Nested loops, Break and continue statements.

Unit 3	**Functions & Recursion**	**09 hours**

Functions & Recursion: Need for function, function declaration /Function prototype, Function Definition, Function calling. Passing parameter to the Function: Call by value and call by reference, Scope: Block scope, function scope.
Storage Classes: Auto, register, Extern, static, Recursion.

Unit 4	**Arrays and Pointers**	**09 hours**

Arrays & Pointers: Fundamental of Array: One dimension Array, Declaration, Initialization. Operations on Array: Insertion, deletion, traversing. Passing 1D array to functions, 2-D array and its operations
Pointers: Introduction, Pointer declaration, and Pointer Arithmetic, Pointer and Arrays, Pointer to Pointer, Arrays of Pointers.

Applications of pointer: Dynamic memory allocation.

Unit 5	Strings, Structure & File Handling	09 hours

String handling: Reading, writing strings, String functions: strlen( ), strcpy( ), strcat( ), strrev (), strcmp( ), and their implementation as user-defined.
Structure & Union: Introduction of Structures: Structure declaration, Initialization, Accessing the member of structure. Nested structure and Array of structure. Passing individual members, Passing the entire structure. Introduction to Union.
File Handling: Introduction to file Handling.

Total Lecture Hours | **45 hours**

Textbook:

1. Herbert Schildt. "TheCompleteReferenceC",4th Edition, TMH,2017.
2. Brian W. Kernighan and Dennis M. Ritchie, "The C programming Language" 2nd Edition, Pearson Education India,2015
3. Let Us C: Authentic guide to C programming language - Nineteenth edition (December 2022); BPB Publications, Ansari Road, Dariya Ganj
4. E. Bala Guruswamy, Programming in ANSI C", Eighth edition, TMH, 2019
5. Ashok N. Kamthane and Amit A Kamthane "Programming in C", 3rd Edition, Pearson Education,2015.

Reference Books:

1. B. A. Forouzan, R. F. Gilberg, B.G. Geetha, and G. Singaravel, "Computer Science: A structured Programming approach Using C", 3rd Edition, Cengage, New Delhi,2012
2. H. Cooper and H. Mullish, "The Spirit of C", 4th Edition, Jaico Publishing House, 2006
3. Paul Deitel, Harvey Deitel, "C How to Program", 8th Edition (February 2015), Pearson.

Mode of Evaluation

Evaluation Scheme						
MSE		CA			ESE	Total Marks
MSE 1	MSE 2	CA1	CA2	CA3(ATT)		
30	30	6	6	3	75	150
60		15				

Course Code: MA202L	Course Name: Discrete Structures & Theory of Logic	L	T	P	C
		3	0	0	3

Pre-requisite: X+2

Course Objectives:

1. The objective of this course is to familiarize the graduate students with the fundamentals of discrete structure and theory of logics.
2. It aims to apply the theory of inferences and graphs in solving the advanced technological problems.

Course Outcome: After completion of the course, the student will be able to

1. Acquire knowledge of sets, relations and functions.
2. Apply fundamental concepts of functions and Boolean algebra in logical reasoning and computational abilities.
3. Employ the rules of propositions, theory of inferences and predicate logic in logical reasoning problems.
4. Understand the concepts of algebraic structures and their applications to apply in critical thinking
5. Apply the concept of graph theory in solving shortest path engineering problems

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	2	-	-	1	-	-	-	2
CO2	3	3	-	2	2	-	-	1	-	-	-	2
CO3	3	3	-	2	2	-	-	1	-	-	-	2
CO4	3	3	2	2	2	-	-	1	-	-	-	2
CO5	3	3	2	2	2	-	-	1	-	-	-	2

Unit 1	Sets, Relations & Functions	09 hours

Introduction to Set Theory, Relations and its Properties, Equivalence relation, Recursive relation, Order of relations. Function and its types, Composite function, Growth of functions.

Unit 2	Lattices & Boolean Algebra	09 hours

POSET, Hasse Diagram, Lattices – Bounded, Complemented, Distributed, Modular and Complete lattice.

Introduction to Boolean Algebra, Algebraic simplification of Boolean expressions, Karnaugh maps for two and three variables.		
Unit 3	**Theory of Logic**	**09 hours**
Proposition, Truth tables, Tautology, Contradiction, Algebra of proposition, Theory of Inference. First order predicate logic, quantifiers, Inference theory of predicate logic. Applications of Predicate Logics: Discuss the case studies like Family- Tree, Water-Jug, Monkey-Banana problems, etc.		
Unit 4	**Algebraic Structures**	**09 hours**
Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Definition and elementary properties of Rings and Fields, Applications of Group Theory: Coordination of Robot Arms in a Factory, Allocating Resources for a Community Garden		
Unit 5	**Graph Theory**	**09 hours**
Introduction to Graphs theory, Multigraphs, Bipartite graphs, Planar graphs, Isomorphism and Homeomorphism of graphs, Euler and Hamiltonian graph Applications of Graphs: Discuss one or two case studies like Finding shortest path: travelling sales man problem, Chinese postman problem		
	Total Lecture Hours	**45 hours**

Textbook:

1. Trembley, J.P & R. Manohar, "Discrete Mathematical Structure with Application to Computer Science", Tata McGraw Hill. 1997 2nd edition Reprint 2017
2. Swapan Kumar Sarkar, A Textbook of Discrete Mathematics, S Chand Publishing

Reference Books:

1. C. L. Liu, Elements of Discrete Mathematics: A Computer Oriented Approach, McGraw Hill. 4th edition (Paperback 2017)
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, PhI Learning
3. E.R. Scheinerman, Mathematics: A Discrete Introduction, Brooks/Cole, 3rd edition
4. Thomas Koshy, Discrete Mathematics with Application, Elsevier Pub. 2004
5. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGraw-Hill
6. Liptschutz, Seymour, "Discrete Mathematics", McGraw Hill, 3rd edition (Paperback 2017)
7. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, Prentice Hall, 3rd edition

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
30	30	6	6	3	**75**	**150**
60		**15**				

Course Code: EC201L	**Course Name: Computer Organization & Logic Design**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Pre-requisite: NA

Course Objectives:

1. Explore the basics of digital logic, including number systems and logic gates.
2. Perform the analysis and design of various digital electronic circuits.
3. Explore the knowledge of Computer organization and memory concepts.
4. Work in a team to demonstrate an application of digital circuits by engaging in self-learning.

Course Outcome: After completion of the course, the student will be able to

1. Apply the basics of binary arithmetic and codes in digital system design.
2. Design combinational logic circuits using Boolean functions and gate-level minimization
3. Design sequential logic circuits, including latches, flip-flops, registers, and counters.
4. Understand computer organization, including bus architecture, processor organization, and I/O systems.
5. Understand memory organization, cache, and virtual memory.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	1	-	-	-	-	-	-

CO2	3	3	2	2	1	1	-	-	-	-	-	-
CO3	3	3	2	2	1	1	-	-	-	-	-	-
CO4	3	3	2	2	2	2	-	-	-	-	-	-
CO5	3	3	2	2	1	1	-	-	-	-	-	-

Unit 1	**Digital Design And Binary Numbers**	**09 hours**

Binary Arithmetic, Negative Numbers and their Arithmetic, Floating point representation, Binary Codes, Cyclic Codes. Multiplication: Signed operand multiplication. Division and logic operations. Floating point arithmetic operation, IEEE Standard for Floating Point Numbers

Unit 2	**Combinational Logic Circuits**	**09 hours**

Minterm and Maxterm, Boolean Algebra, Realization of Boolean Functions, SOP and POS simplification, Gate-level minimization: The K-map method up to four variables, don't care conditions. NAND and NOR implementation. Binary Adder-Subtractor, Look ahead carries adders Code Converters, Decimal adder, Magnitude Comparator, Decoders, Encoders, Multiplexers, Arithmetic & logic unit design.

Unit 3	**Sequential Logic Circuits**	**09 hours**

Sequential Circuits, Storage Elements: Latches, Flip Flops, Registers and Counters: Shift Registers, Ripple Counter, Synchronous Counter, Other Counters.

Unit 4	**Basics Of Computer Organization And Input/Output**	**10 hours**

Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, general registers organization, stack organization and addressing modes.

Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors.

Unit 5	**Memory**	**08 hours**

Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Introduction to Virtual Memory and Cache Memory.

	Total Lecture Hours	**45 hours**

Textbook:

1. Mano Morris, "Digital Logic and Computer Design", 4th Ed., Pearson Education, 2006
2. Mano Morris, "Computer System Architecture", 3th Ed., Pearson Education, 2006
3. Anand Kumar, "Fundamentals of Digital Circuits", 4th Ed., PHI, 2016.
4. Jain R. P. and Anand M. H. S., "Digital Electronics Practices using Integrated Circuits", 1st Ed., TMH, 2004.
5. Lee Samual, "Digital Circuits and Logic Design", 1st Ed., PHI, 1998.
6. Floyed Thomas L. and Jain R. P., "Digital Fundamentals", 8th Ed., Pearson Education, 2006
7. Digital system design using VHDL / by *Charles* H. *Roth*. p. cm. ISBN 0-534-95099-X ,4th Edition. PWS Publishing Company.

Reference Books:

1. Brown S. and Zvonko Vranesic, "Fundamental of Logic with Verilog Design", 1st Ed., Tata McGraw Hill, 2003.
2. Circuit Design with VHDL, third edition, by Volnei A. Pedroni, 14 April 2020.

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
30	30	6	6	3	**75**	**150**
60		**15**				

Course Code: IT103L	**Course Name: Design Thinking**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

Pre-requisite: NA

Course Objectives:

1. To expose the student with state of the art perspectives, ideas, concepts, and solutions related to the design and execution of projects using design thinking principles.
2. To prepare the mindset and discipline of systemic inspiration driven by a desire to identify new sources of ideas, and new models especially outside their regular working atmosphere.

3. To propose a concrete, feasible, viable and relevant innovation project/challenge.

Course Outcome: After completion of the course, the student will be able to

1. Understand the basic requirements of a good design.
2. Empathize and ideate the solutions to problems in his environment
3. Prototype and test the developed solutions.
4. Apply the principles of design thinking on developing innovative solutions to the real world problems.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3	2	-	1	-	-	2	2	-	2
CO2	1	2	3	2	-	1	-	-	2	2	-	2
CO3	1	2	3	2	-	1	-	-	2	2	-	2
CO4	1	2	3	2	-	1	-	-	2	2	-	2

Unit 1	**Fundamentals Of Design Thinking**	**04 hours**

Concept of Design Thinking, Need of Design Thinking, Goal of Design thinking (Desirability, feasibility and viability), Design thinking Process model, Design thinking tools.

Activities: Identify an Opportunity, Scope of the Project, Explore the possibilities and prepare a design brief.

Unit 2	**Empathize And Define**	**04 hours**

Design thinking phases, how to empathize, Role of empathy in design thinking, the purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools: Customer Journey Map, Personas. Define- Methods of Define Phase: Storytelling.

Activities: Apply the methods of empathizing and Define Phases Finalize the problem statement.

Unit 3	**Ideation**	**04 hours**

Challenges in idea generation, Visualize, Empathize, and Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Create Thinking, Generating Design Ideas, Lateral Thinking, Analogies, Brainstorming, Mind mapping,

Ideation Tools: How Might We? (HMW), Storyboard, Brainstorming. What is design innovation? A mindset for innovation, and asking "What if?" asking "What wows?" and "What works?"

Activities: Apply the methods of Ideate Phase: Generate Innovative solution ideas.

Unit 4	**Prototyping And Testing**	**03 hours**

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype. Testing prototypes with users, Collect feedback; iterate and improve the ideas.

Activities:

1. Prototype: Apply the Methods of the Prototype Phase - Create prototypes for selected ideas.

Testing: Collect feedback; iterate and improve the ideas Present your solution using the Storytelling method.

	Total Lecture Hours	**15 hours**

Textbook:

1. Design Thinking, A Beginner's Perspective, E Balaguruswamy, Bindu Vijayakumar, Mc Graw Hill,2024
2. The Design Thinking Playbook, Michael Lewrick (Author), Patrick Link (Author), Larry Leifer (Author) Publisher Wiley, Edition 2018.
3. Design Thinking For Dummies, Prof. Dr. Christian Müller- Roterberg, Wiley, 2021
4. The Design of Everyday Things, Don Norman(Author), Navol Books Trading, Edition 2022.

Reference Books:

1. Design Thinking, A Beginner's Perspective, E Balaguruswamy,Bindu Vijayakumar, Mc Graw Hill,2024
2. The Design Thinking Playbook, Michael Lewrick (Author), Patrick Link (Author), Larry Leifer (Author) Publisher Wiley, Edition 2018.
3. Design Thinking For Dummies, Prof. Dr. Christian Müller- Roterberg, Wiley, 2021
4. The Design of Everyday Things, Don Norman(Author),Navol Books Trading, Edition 2022
5. Designing Experiences, James Robert Rossman and Mathew D. Duerden, Columbia Business School Pub, Edition 2019.

6. Roger Martin, "The Design of Business: Why Design Thinking is the Next CompetitiveAdvantage", Harvard Business Press, Edition 2009.
7. Idris Mootee, Design Thinking for Strategic Innovation,2013, John Wiley & Sons Inc.

Mode of Evaluation

Evaluation Scheme					
MSE	**CA**			**ESE**	**Total Marks**
-	**CA1**	**CA2**	**CA3(ATT)**	-	**50**
	20	25	5		
	50				

Course Code: EE112B	**Course Name: Introduction to IoT**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

Pre-requisite: NA

Course Objectives:

1. The course aims to provide exposure to the applications of IoT in smart cities and industrial applications.
2. It aims to train the students to the basic concepts of the Embedded C and Controllers.
3. This course is designed to give the students hands-on experience with the Software and Hardware concepts.

Course Outcome: After completion of the course, the student will be able to

1. Understand the basic concepts of sensors and transducers.
2. Understand basics of embedded system and different IoT boards.
3. Apply basic operations and programming techniques of IoT devices.
4. Apply smart technology knowledge through case studies.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	2	2	2	-	-	-	-	2
CO2	2	-	2	-	2	2	2	-	2	-	-	2
CO3	3	-	3	2	3	2	2	-	2	-	-	2
CO4	3	2	3	3	3	2	2	-	2	-	-	2

Unit 1	**Sensing Devices & Transducers**	**15 hours**

Sensors & Transducer: Definition, Types & selection criterion of sensors, Classification of Sensors & Transducer based on principle of operation, Fundamentals & Applications of Potentiometer, Fundamentals & Applications of strain gauge.

Hands-on/Case Study/ Mini-Project/ Problem solving:

1. Understanding Sensors and Transducers: Types, Operation Principles, and Selection Criteria.
2. Role of Sensors and Transducers in Internet of Things (IoT) Systems.
3. Hands-on Introduction to commonly used real world IoT Sensors.
4. Hands-on Introduction to different controllers used in IoT.

Unit 2	**Embedded Systems Fundamentals**	**15 hours**

Introduction to Embedded C: Interfacing Basics, Digital I/O, Analog I/O, Differences between standard C and Embedded C, Introduction to Arduino (ATmega328P), Arduino board components and architecture, Introduction to Raspberry Pi 5, Understanding GPIO pins and their modes, Interfacing DHT11 with Arduino.

Hands-on/Case Study/ Mini-Project/ Problem solving:

1. Understanding the Architecture and Pin Configuration of Arduino Boards.
2. Analyze Digital signal data acquisition using Arduino.
3. Explore Digital signal generation using Arduino.
4. Analyze Analog signal data acquisition using Arduino.
5. Explore Analog signal generation using Arduino.

Unit 3	**IoT Board**	**15 hours**

Introduction to IoT in Modern Industry Applications, Basic Operations of IoT, Basics of ESP 8266 programming, Introduction to Blynk IoT, Interfacing with Different types of Sensors: Touch Sensor, Alcohol Sensor (MQ 3), LPG Sensor (MQ 6), Relay, Light Dependent Resistor (LDR), IR (Infrared) Sensors and PIR (Passive Infrared) Sensors.

Hands-on/Case Study/ Mini-Project/ Problem solving:

1. Understanding the Architecture and Pin Configuration of ESP8266.

2. Analyze Digital / Analog signal data acquisition using ESP8266.
3. Explore Digital / Analog signal generation using ESP8266.
4. Real-Time Data Logging Using ESP8266 and Arduino.

Unit 4	**Smart Sensor Technologies**	**15 hours**

Intelligent Sensors: General Structure of smart sensors & its components, Case study of Air Quality Monitoring System, Case study of Soil Health Monitoring System, Case study of Water Quality Monitoring System.

Hands-on/Case Study/ Mini-Project/ Problem solving:

1. Designing a Lighting Control System using LDR.
2. Designing a Multi-Sensor Alert System Using Touch, IR, PIR and Arduino.
3. Object Detection Using Ultrasonic Sensors with Arduino and ESP.
4. Building IoT Applications with Blynk: Monitoring Temperature and Humidity with DHT11 Sensor.
5. Building IoT Applications with Blynk: Smart Home Automation Using ESP8266 and Blynk.
6. Building a Soil Health Monitoring system using NPK sensor.

Total Lecture Hours	**60 hours**

Textbook:

1. Raj Kamal, "Internet of Things: Architecture and Design Principles", McGraw Hill Education (India) Private Limited CHENNAI.
2. Waldemar Nawrocki , "Measurement Systems and Sensors" , Artech House Boston , London.
3. K. Krishnaswamy and S. Vijayachitra ,"Industrial Instrumentation", New Age International Publishers.
4. D. Patranabis, "Sensors and Transducers" , PHI Learning Pvt. Ltd. Delhi.

Reference Books:

1. Murty D.V.S, “TRANSDUCERS AND INSTRUMENTATION”, 2ND EDN, PHI.
2. Rajkumar Buyya and Amir Vahid Dastjerdi , "Internet of Things: Key Applications and Protocols" Elsevier.
3. "Internet of Things: A Hands - on approach" by Arsheep Bahga and Vijay Madisetti., Orient Blackswan Private Limited - New Delhi 2.
4. Pethuru Raj and Anupama C. Raman. “The Internet of Things: Enabling technologies, platforms, and use cases”. Auerbach Publications.
5. "The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and Beagle Bone Black" by Donald Norris, McGraw-Hill Education TAB.

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
30	30	6	6	3	**75**	**150**
60		**15**				

Course Code: ME101B	**Course Name: Design and Realization**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

Pre-requisite: NA

Course Objectives:

1. To familiarize students with the modern technologies used in industries.
2. To realize the fundamentals of Computer Aided Design & digital manufacturing

Course Outcome: After completion of the course, the student will be able to

1. Understand the concept of Computer-Aided Design (CAD).
2. Apply CAD software to create basic 3D models.
3. Apply CAD and Additive Manufacturing software for 3D printing.
4. Understand the fundamentals of Computer-Aided Manufacturing and CNC machining.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	-	-	-	-	2	-	-	-	-	2	-	3
CO2	2	-	2	-	3	-	-	-	-	2	-	3
CO3	2	-	2	-	3	-	-	-	2	2	-	3
CO4	-	-	-	-	2	-	-	-	2	2	-	3

Unit 1	Computer-aided Design- 2D Drawing	20 hours
Introduction to Engineering drawing, First and third angle projection. Orthographic Projection: projection of point, Projection of solids, Principles of isometric projection, Introduction to computer-aided design, Structure of Autodesk Inventor Professional, Understanding the GUI and tools of Autodesk Inventor, 2D Drawing/Sketching and Editing Commands, Understanding geometric constraints. **Hands-on/Case Study/ Mini-Project/ Problem solving:** Problem Solving on 2D sketching on Autodesk Inventor		
Unit 2	**Computer-aided Design- 3D Modelling**	**20 hours**
Introduction to 3D modelling, understand 3D commands in Autodesk Inventor, including extrude, revolve, loft, and sweep, etc., creating 3D parts from 2D sketches, Part editing and modification, Assembly modelling and constraints, Generating exploded views and animations. **Hands-on/Case Study/ Mini-Project/ Problem solving:** Problem Solving on 3D sketching on Autodesk Inventor		
Unit 3	**3D Printing/ Additive Manufacturing**	**10 hours**
Introduction to 3D printing, 3D scanning, Preparing 3D models for printing, AM file formats, slicing-uniform slicing and adaptive slicing, Process-path generation, Understanding the interface of AM Software: Ultimaker Cura or similar, Design considerations for 3D printing (supports, overhangs, infill), Post processing of 3D printed parts, Introduction to 3D printing Techniques - Liquid based, Solid state and Powder based techniques for 3D printing. **Hands-on/Case Study/ Mini-Project/ Problem solving: Designing a 3D model and print using 3D printer.**		
Unit 4	**Computer Aided Manufacturing**	**10 hours**
Introduction to CNC Machining, Types of CNC machines, Components of a CNC machine (e.g., controller, spindle, axes, ATC), CNC machine configurations (e.g.,3-axis,5-axis). CNC Programming Basics: Introduction to G-code and M-code programming, 3D modelling for CNC machining, understanding file formats for CNC machines **Hands-on/Case Study/ Mini-Project/ Problem solving: Designing a 3D model and fabrication using a CNC machine.**		
	Total Lecture Hours	**60 hours**

Textbook:

1. Engineering Graphics & Design, P. S. Gill.
2. Computer-Aided Graphics and Design, Daniel L. Ryan
3. Computer-Aided Design and Manufacturing by M. Groover

Reference Books:

1. Engineering Graphics With AUTOCAD, Kulkarni D.M
2. An Introduction to 3D Printing by Victoria Zukas and Jonas A. Zukas
3. Computer Aided Manufacturing, P.N. Rao, N.K. Tewari, T.K. Kundra

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
30	30	6	6	3	**75**	**150**
60		**15**				

Course Code: MA103L	Course Name: Linear Algebra for Engineers	L	T	P	C
		3	1	0	4

Pre-requisite: NA

Course Objectives:

1. The objective of this course is to develop a strong foundation in linear algebra and to impart the knowledge of tools from intermediate to advanced level of mathematics.
2. Students will be equipped with the necessary skills to apply linear algebra to solve complex engineering problems.

Course Outcome: After completion of the course, the student will be able to

1. Understand the concept of vector space and subspaces.
2. Apply elementary transformation to solve system of Linear equations.
3. Understand the concept of complex matrix and Eigen vectors
4. Apply the concept of matrix factorization in data decomposition.
5. Explore the concept of linear transformations and inner product in engineering applications.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	-	-	1	-	-	-	2
CO2	2	2	2	-	-	-	-	1	-	-	-	1
CO3	2	2	2	-	-	-	-	1	-	-	-	1
CO4	2	2	2	-	-	-	-	1	-	-	-	1
CO5	2	2	2	-	-	-	-	1	-	-	-	1

Unit 1	Vector Spaces	09 hours
Definition of Field, Introduction to Vector Spaces, Basic Properties of Vector Spaces, Sub spaces, Linear dependence and independence of vectors, Basis and Dimension.		
Unit 2	**Matrix Algebra-I**	**09 hours**
Introduction to Matrices, Elementary Transformation, Inverse by E- transformation, Rank of a Matrix by Echelon Form, Solution of system of linear Equations by direct method (Gauss Elimination Method), and Iterative method (Gauss Seidel Method)		
Unit 3	**Matrix Algebra-II**	**09 hours**
Hermitian, Skew Hermitian, Unitary Matrices. Eigen Values & Eigen Vectors, Cayley Hamilton theorem (without proof) and its applications.		
Unit 4	**Applied Matrix Algebra**	**09 hours**
Similarity transformation, Diagonalization of matrix, Eigen Value Decomposition and Singular Value Decomposition, Matrix factorization, LU Decomposition (Dolittle method).		
Unit 5	**Linear Transformation & Inner Product Space**	**09 hours**
Linear transformation, Matrix representation of Linear Transformation, Rank and Nullity, Kernel and Range, Rank Nullity Theorem (without proof). Introduction to inner product space, Norm of a vector, Orthogonality and orthonormality of vectors, Gram Schmidt orthogonalization process and its applications		
	Total Lecture Hours	**45 hours**

Textbook:

1. Hoffman, K. and Kunze, R., "Linear Algebra", Pearson Education (Asia) Pvt. Ltd/ Prentice Hall of India, 2015
2. Nair, M.T. & Singh A., Linear Algebra, Springer, 2019.
3. Strang, Gilbert, Linear Algebra and its Application, Cengage Learning, 4th edition, 2005.
4. Jain, M.K., Iyengar, S.R.K. and Jain R.K., Numerical Methods, New Age International Publishers, 2019

Reference Books:

1. Schaum's Outline of Linear Algebra, McGraw Hill Education 2017
2. Strang, G., "Linear Algebra and Its Applications", Thomson Learning Asia Pvt. Ltd.4th edition ,2005.
3. Lay, Dand C., "Linear Algebra and Its Applications" Pearson Education Limited, 6th edition 2020.
4. Richard, L. Burden, J. Douglas Faires, and Annette Burden, Numerical Analysis, Cengage Learning, 10th edition, 2015.
5. Sastry S. S. "Introductory Methods of Numerical Analysis", PHI, 3rd edition 2002.

Mode of Evaluation

Evaluation Scheme						
MSE		CA			ESE	Total Marks
MSE 1	MSE 2	CA1	CA2	CA3(ATT)		
40	40	8	8	4	100	200
80		20				

Course Code: CS201B	Course Name: Data Structure	L	T	P	C
		3	0	2	4

Pre-requisite: The course requires background in mathematics and sufficient programming skills.

Course Objectives:

1. To provide a deep understanding of fundamental data structures and their applications.
2. To provide expertise in the efficient implementation of physical and logical data structures.
3. To provide insight into the working of searching and sorting algorithms.
4. To develop the analytical ability for solving real-world problems using data structures.

Course Outcome: After completion of the course, the student will be able to

1. Use the concept of the array in searching and sorting algorithms.
2. Illustrate the concept of Dynamic Memory Allocation for operations on linked list.

3. Analyze different recursion techniques using stack.
4. Analyze the fundamental concept of queues.
5. Apply the knowledge of tree and binary tree structures for problem solving.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	-	1	1	-	-	-	-	-	2
CO2	3	2	2	1	1	1	-	-	-	-	-	2
CO3	3	2	2	1	1	1	-	-	-	-		2
CO4	3	2	2	1	1	1	-	-	-	-	-	2
CO5	3	2	1	-	1	1	-	-	-	-	-	2

Unit 1 **Introduction** **15 hours**

Basic Terminology, Types and application of Data Structures, Algorithm, Efficiency of an algorithm, Time space trade off and complexity, asymptotic notation. Array: Single and Multidimensional Arrays, Representation of Arrays: Row Major Order, and Column Major Order, Derivation of Index Formulae for 1-D,2-D,3-D and n-D Array Application of arrays, Sparse Matrices, and their representations, arithmetic operations on matrices. Searching: Linear search, Binary Search, Indexed Sequential Search, Sorting: Insertion Sort, Bubble sort, Selection sort, Quick Sort, Merge Sort.

Application Area: Matrix, Dynamic Programming, Radix Sort, Bucket Sort Buffer or Cache, Stack & Queue, Graph Representation, Tree, Image Processing, Signal Processing, Databases, Web Search Engines, Networking Routing.

Problem solving:

1. Write a program to find the sum of elements of positive and negative elements of a one- dimensional array.
2. Given an integer array nums, write a program to print true if any value appears at least twice in the array, and return false if every element is distinct.
3. Nirobi has given a matrix C of size N x M to Rio. Also, Rio is given the position of submatrix as X1, Y1, and X2, Y2 inside the matrix. Now Rio needs to find the sum of all elements inside that submatrix. Can you help Rio in completing the task assigned by Nirobi?
4. Write a program to implement linear search on an array of integers. Return the index of the target if found, else return -1.
5. Given a sorted array of distinct integers and a target value, write a program to print the index if the target is found. If not, return the index where it would be if it were inserted in order.
6. Write a program to convert a 2D matrix into a triplet representation if it is sparse, and reconstruct the original matrix from the triplet form.
7. Write a program to sort an array using bubble sort**.** Display the array after each pass and count the number of swaps and comparisons.
8. Write a program to sort an array using selection sort**.** Display the intermediate steps and total comparisons made.
9. Write a program to sort the given elements using insertion sort technique.
10. Write a program to sort an array of length n using Merge sort.
11. Write a program to sort an array of length n using quick sort.

Unit 2 **Linked List** **15 hours**

Singly Linked Lists, Doubly Linked List, Circularly Linked List, Operations on a Linked List. Insertion, Deletion, Traversal, Reversing, Polynomial Representation and Addition. Generalized Liked list.

Application Area: Symbol table implementation, Memory Management, Tries, Tree, Graph, Music and Video Playlists, Undo/Redo Functionality, Hash Tables and Collision Resolution

Problem solving:

1. You are given the pointer to the head node of a linked list and an integer to add to the list. Create a new node with the given integer. Insert this node at the tail of the linked list and return the head node of the linked list formed after inserting this new node. The given head pointer may be null, meaning that the initial list is empty.
2. Given the head of a linked list, write a program to determine if the linked list has a cycle in it or not.
3. Write a function to reverse a singly linked list. Given the head of the linked list, modify the list in-place to reverse its order and return the new head of the reversed list.
4. Write a function to insert a given value into the middle of a singly linked list. If the list has an even number of nodes, insert the value after the first half. Return the head of the modified linked list.
5. Write a function to delete every alternate node from a given doubly linked list, starting with the second node. Modify the list in place and return the head of the updated list.
6. Write a program to create a circular singly linked list**,** insert elements, and traverse the list in a circular manner starting from the head node.

7. Write a program to perform deletion operations (beginning, end, specific position) in a circular singly linked list and display the result.
8. Write a function to reverse a singly linked list in groups of size k. Given the head of the linked list and an integer k, reverse the nodes of the list k at a time. If the number of nodes in the last group is less than k, leave the remaining nodes as they are.
9. Write a program to represent a polynomial using a singly linked list**,** where each node contains a coefficient and exponent.
10. Write a program to add two polynomials represented using singly linked lists. Output the resulting polynomial after addition.

Unit 3	**Stack**	**15 hours**

Abstract Data Type, Primitive Stack operations: Push & Pop, Array and Linked List Implementation of Stack, Application of stack: Prefix and Postfix Expressions, Evaluation of postfix expression, Tail recursion, Head Recursion, Nested recursion, Removal of recursion. Problem solving using iteration and recursion with examples such as Fibonacci numbers, and Hanoi towers. Trade-offs between iteration and recursion.

Application Area: Function Call Stack, Optimal Parentheses Problem in Matrix multiplications, Backtracking, Depth-First Search, Parsing and Compiler Design, Process Control Block, Memory Management.

Problem solving:

1. Write a program to implement a stack using an array with basic operations: push, pop and display.
2. Write a program to implement a stack using a linked list. Include stack operations: PUSH, POP, and DISPLAY.
3. Write a program to convert a valid infix expression to postfix notation using a stack.
4. Write a program to convert a valid infix expression to prefix notation using a stack.
5. Write a program to evaluate a postfix expression using a stack. Support basic arithmetic operators (+, -, *, /).
6. Write a recursive program that demonstrates tail recursion with a simple function like factorial calculation.
7. Write a recursive program that demonstrates head recursion to print numbers from n down to 1.
8. Write a program to generate Fibonacci numbers using both iteration and recursion. Compare and comment on performance and memory usage.
9. Write a recursive program to solve the Tower of Hanoi problem for n disks and print the sequence of moves.
10. Simulate the computation of factorial using a stack (non-recursive approach). Show the stack at each stage of the computation.

Unit 4	**Queue**	**15 hours**

Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, Array and linked implementation of queues, Double Ended queue, and Priority Queue. **Application Area:** Job Scheduling, Breadth-First Search, Search Trees and Binary Search Tree, Database Operations, Customer Service, Web Server Request Handling, Buffering and Data Streaming, Traffic Management.

Problem solving:

1. Write a program to implement a linear queue using an array with operations: ENQUEUE, DEQUEUE, DISPLAY, and check for OVERFLOW and UNDERFLOW.
2. Write a program to implement a queue using a linked list**.** Perform ENQUEUE, DEQUEUE, and DISPLAY operations dynamically.
3. Write a program to implement a circular queue using an array and support the basic operations: insert, delete, and display queue elements with proper wrap-around logic.
4. Write a program to implement a circular queue using linked list**,** handling both front and rear pointers correctly.
5. Write a program to implement a double-ended queue (de-queue) using an array or linked list. Support insertions and deletions from both ends.
6. Write a program to implement a priority queue using array, where each element has a priority, and the dequeue operation always removes the element with the highest priority.
7. Simulate a CPU job scheduling system using a priority queue**,** where higher-priority jobs are executed first.
8. Use a dequeue to check whether a given string is a palindrome. You can insert and remove characters from both ends.

Requirements:

- Insert characters of string into dequeue
- Remove one character from front and rear in each iteration
- If all characters' match, it's a palindrome

Sample Input:

"radar"

Expected Output:
"The string is a palindrome"

Unit 5	**Trees**	**15 hours**

Binary Tree and Its array and linked list representation, Strict Binary Tree, Complete Binary Tree, Tree Traversal algorithms: In- order, Pre-order and postorder, level order, Constructing Binary Tree from given Tree Traversal, BST Operation: Searching, Insertion, Deletion, Threaded Binary Trees, Traversals in Threaded Binary Trees, Heaps, Heap Sort.

Application Area: Dictionary Implementation, Compiler Design, Graph Algorithms, In order Traversal Optimization

Problem solving:

1. Write a program to create a binary tree using linked representation**.** Implement insertion of nodes manually and display the structure using level-order traversal**.**
2. Write a program to implement a binary tree using array representation**.** Provide functions to insert and retrieve the left and right child of a given node.
3. Given a binary tree, write a program to check whether it is a strict binary tree (every node has 0 or 2 children) and whether it is a complete binary tree**.**
4. Write a program to implement recursive and non-recursive versions of in-order**,** pre-order**,** and post-order traversal of a binary tree.
5. Write a program to construct a binary tree from the given inorder and preorder traversal arrays**.** Display the tree using level order traversal.
6. Write a program to create a Binary Search Tree and implement insert() and search() operations.
7. Extend the previous BST program to support deletion of nodes (handling all three cases: leaf, one child, two children). Display in-order after deletion.
8. Write a program to create a Threaded Binary Tree and perform in-order traversal without recursion or stack**.**
9. Extend the threaded binary tree implementation to support preorder traversal using threading logic.
10. Write a program to create a Min-Heap and Max-Heap using an array. Include operations to insert(), delete(), and heapify() the structure.
11. Write a program to sort an array using Heap Sort**.** Display the original and sorted array using both Min-Heap and Max-Heap logic.

Total Lecture Hours	**75 hours**

Textbook:

1. Horowitz, E., Sartaj Sahni, & Anderson-Freed, S. (2008). Fundamentals of data structures in C. University Press.
2. Lipschutz, S. (2014). Data structures. Mcgraw Hill Education (India) Private Limited.
3. Deshpande, P. S., & Kakde, O. G. (2009). C and data structures. Dreamtech Press.
4. Aaron M. Tenenbaum, Langsam, Y., & Augenstein, M. (2003). Data Structures Using C.

Reference Books:

1. Aho, A. V., Hopcroft, J. E., & Ullman, J. D. (2009). Data Structures and algorithms. Dorling Kindersly.
2. Kruse. (n.d.). Data Structures and Program Design in C. Pearson Education India.
3. Kernighan, B. W., & Ritchie, D. M. (2015). The C programming language. Pearson.
4. Van, P. (1994). Expert C programming: deep C secrets. Sunsoft Press.
5. Deitel, P., & Deitel, H. (2016). C How to Program, Global Edition. Pearson Higher Ed.

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
40	40	8	8	4	**100**	**200**
80		**20**				

Course Code: IT106B	**Course Name: Introduction to Cyber Security**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

Pre-requisite: Basics of Computer and Internet.

Course Objectives:

To equip students with a foundational understanding of Networks and Computer Security. To make them aware about security threats, vulnerabilities, attacks. To give them brief introduction about forensics and cyber laws.

Course Outcome: After completion of the course, the student will be able to

1. Understand computer networks, its history, key concepts, communication models and network utilities.
2. Understand computer security principals, vulnerabilities and basic attacks.
3. Differentiate among various scanning techniques, attacks and protection against cyber crimes.
4. Understand concepts and procedures of computer forensics.
5. Describe cyber laws and Indian legal system related to cybercrimes

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	1	1	-	-	-	2	1	3
CO2	3	2	1	3	2	1	-	1	-	1	-	3
CO3	3	2	1	3	2	1	-	1	-	1	-	3
CO4	3	-	1	1	2	1	-	-	2	1	1	3
CO5	3	-		-	-	2	1	3	-	1	-	3

Unit 1	**Introduction to Networks**	**12 hours**

Introduction to Network, Types of Networks, History of Internet, General Architecture of Internet, OSI Model, TCP/IP Protocol Architecture, IP Addresses, MAC Addresses, Port Address Uniform Resource Locators and their role, Basic Network Utilities, IP Config, Ping, Tracert.

Unit 2	**Introduction to Computer Security**	**12 hours**

Computer Security Principals, CIA Triad, Importance of Information and its Security, Computer Vulnerabilities, Types of Attacks, Malware, Virus, How a Virus Spread, Types of Viruses, Recent Virus Examples, Worms, Trojan Horse, Denial of Service Attacks, Common Tools used for DOS, DOS Weaknesses, DDOS, Web Attacks, Session Hijacking, DNS Poisoning, Some Latest Attacks- Ransomware Attacks, Website Disruptions, Data Breaches, Basic Security Terminology.

Case Study: A Business Trip to South America Goes South
https://www.nist.gov/system/files/documents/2020/09/30/Cybersecurity-Case-1.pdf
Case Study: The Colonial Pipeline Ransomware Attack

Unit 3	**Understanding Cyber Attacks**	**12 hours**

Introduction to Cyber Frauds, Phishing, Cyber Stalking, Types of Attacks: Investment Offers, Auction Frauds, Identity Theft, Hacking Techniques, Basic Terminology, Passive Scanning Techniques, Active Scanning Techniques, Actual Attacks, SQL Script Injection, Cross-Site Scripting, Protecting Yourself against Cyber Crime, Protecting against Identity Theft, Secure Browser Settings.

Case Study: Hotel CEO Finds Unwanted Guests in Email
Accounthttps://www.nist.gov/system/files/documents/2020/09/30/Cybersecurity-Case-4.pdf
Case Study: Resume Looters campaign (2023)

Unit 4	**Introduction to Computer Forensics**	**12 hours**

Introduction of Computer Forensics, Cyber forensics and Digital Evidence, Digital Forensics Life Cycle, Document Trail, Secure the Evidence Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Forensics and Social Networking Sites, The Security/Privacy Threats, Challenges in Computer Forensics, Finding Evidence in the Browser, and Finding Evidence in System Logs.

Unit 5	**Cyber Laws**	**12 hours**

Need of Legal Protection from cybercrimes, cyber laws and their scope and coverage: Introduction to Indian Cyber Law, Objective and Scope of the Digital Personal Data Protection Act 2023, Intellectual Property Issues, Overview of Intellectual Property Related Legislation in India, Patent, Copyright, Trademark.

	Total Lecture Hours	**60 hours**

Textbook:

1. Computer Security Fundamentals, 2nd ed: William Easttom, Pearson
2. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, Publish Date 2013.
3. Laws on Cyber Crimes-Dr. Pramod Kr. Singh, Book Enclave, Jaipur
4. The Law and Economics of Cyber Security, Edited by Mark. F. Grady and Francesco Parisi, Cambridge University Press.

Reference Books:

1. Cyber Security Fundamentals: A Real-World Perspective by Kutub Thakur (Author), Al-Sakib Khan Pathan (Author)
2. Information Security Fundamentals (IBM ICE Publication)

Mode of Evaluation

Evaluation Scheme						
MSE		CA			ESE	Total Marks
MSE 1	MSE 2	CA1	CA2	CA3(ATT)		
30	30	6	6	3	75	150
60		15				

Course Code: CS101B	Course Name: Introduction to Data Science	L	T	P	C
		1	0	2	2

Pre-requisite: NA

Course Objectives:

1. To introduce students to the fundamental concepts, tools, and workflows involved in data science and its applications across various domains.
2. To develop basic proficiency in handling data, understanding its types and sources, and using simple tools for data exploration and analysis.

Course Outcome: After completion of the course, the student will be able to

1. Explain the foundational concepts, roles, and lifecycle of data science and assess its impact through real-world applications across diverse domain.
2. Classify and process various data types and formats, apply basic data cleaning techniques, and extract data from multiple sources using standard tools.
3. Demonstrate the ability to use essential data science tools such as Python, Jupyter Notebook, Pandas, SQL, and spreadsheets for basic data manipulation, visualization, and analysis.
4. Evaluate the ethical, legal, and societal implications of data science solutions, including privacy, bias, and fairness, while exploring emerging trends like Generative AI and Responsible AI.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	1	2			2		
CO2	3	2	2	-	-	-	1			1		
CO3	2	3	2	2	2	-			1	2	1	
CO4	2	1	-	-	-	2	3	3		2		2

Unit 1	Fundamentals of Data Science	10 hours

- What is Data Science? Importance and Applications
- Components of Data Science: Statistics, Programming, Domain Expertise
- Roles in Data Science: Data Analyst, Data Engineer, Data Scientist
- Data Science Lifecycle: Business Understanding to Deployment

Lab Sessions: Case Studies in Healthcare, E-commerce, Finance, Social Media.

Unit 2	Data and Data Handling	12 hours

- Types of Data: Structured, Semi-structured, Unstructured
- Introduction to Datasets: Rows, Columns, Features, Labels
- Data Sources: APIs, Web Scraping, Databases

Lab Session:

- Basic Data Cleaning Concepts (Missing values, Duplicates, Inconsistencies)
- Data Formats: CSV, JSON, XML, SQL Tables

Unit 3	Tools and Technologies	12 hours

- Introduction to Python and Jupyter Notebook (basic syntax, variables, lists, loops)
- Overview of Libraries: NumPy, Pandas, Matplotlib (basic usage only)
- Introduction to Spreadsheet Tools (Google Sheets/Excel) for tabular data analysis
- Overview of SQL for simple querying (SELECT, WHERE, JOIN - concept only)
- Introduction to Google Colab and GitHub

Lab Session: Python and Jupyter Notebook. NumPy, Pandas, Matplotlib, SQL, Google Colab and GitHub

Unit 4	Ethical, Legal and Societal Impacts	11 hours

- Data Privacy and Security: Basic Concepts

- Bias and Fairness in Data
- Data Governance and Legal Frameworks (very basic overview: GDPR, Indian IT Act)
- Social Good and Data Science: Responsible AI
- Future of Data Science: Trends and Emerging Topics (AI, Generative AI, Edge AI)

Lab Session: **LLM Model basics and working with Co**-Pilot

Total Lecture Hours	**45 hours**

Textbook:

1. "Data Science: Fundamentals and Applications" Author: Ramesh Sharda, Dursun Delen, Efraim Turban
2. Publisher: Pearson India
3. "Python for Data Science", Author: Dr. R. Nageswara Rao,Publisher: BPB Publications
4. "Data Science from Scratch" (Indian Edition), Joel Grus, O'Reilly / Shroff Publishers
5. "Fundamentals of Data Science", Samuel Burns, Kindle

Reference Books:

1. "Doing Data Science", Cathy O'Neil & Rachel Schutt, O'Reilly Media
2. "An Introduction to Statistical Learning", Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani
3. Springer
4. "Python for Data Analysis", Wes McKinney, O'Reilly Media
5. "The Elements of Data Analytic Style", Jeff Leek, Leanpub

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
20	20	4	4	2	**50**	**100**
40		**10**				

Course Code: AI101B	**Course Name: Introduction to AI**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

Pre-requisite: Python Programming

Course Objectives:

To provide students with a understanding of AI principles and applications, gain insights into computer vision, natural language processing and Gen AI, explore ethical considerations, and acquire hands-on skills in implementing AI solutions for real-world scenarios.

Course Outcome: After completion of the course, the student will be able to

1. Acquire the basic understanding of the fundamental concepts of AI to implement search algorithms
2. Develop the insights of data pre-processing techniques and its visualization
3. Gain a basic understanding of ML, NLP and computer vision to solve real-world problems
4. Apply concepts of uncertainty on AI, decision-making frameworks and reinforcement learning techniques to solve real-world problems
5. Understand the fundamentals of ANN, Gen AI, ChatGPT and AI ethics while exploring the future potential of AI applications

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	1	3	-	3	-	3	1	3	3
CO2	3	3	3	1	3	-	3	-	3	1	3	3
CO3	3	3	3	1	3	-	3	-	3	1	3	3
CO4	3	3	3	1	3	-	3	-	3	1	3	3
CO5	3	3	3	1	3	-	3	3	3	3	3	3

Unit 1	**Introduction to AI**	**12 hours**

Discussion on Course outcomes and Introduction to AI, Motivation and role of Artificial Intelligence, AI from Turing Test to Humanoids, Various approaches to AI, AI concept , terminology and application area, Agents and Environments, Types of AI: Search Based System, Rule Based system, Learning Based System, Adversarial search and Games: Optimal Decisions in games, min-max algorithm, alpha-beta pruning, Constraint satisfaction problem: Constraint Propagation, Backtracking search, local search

Case Study 1 : Intro to n-queens and sudoku solver(using backtracking search) on Google Colab		
Unit 2	**Understanding Data**	**12 hours**
History Of Data, Data Storage And Importance of Data and its Acquisition , The Stages of data processing , Data visualisation **Case study 2**: Customer Segmentation data visualization on Google colab		
Unit 3	**Domains of AI**	**12 hours**
Overview of ML: Supervised Learning, Unsupervised Learning, Overview of NLP : Speech recognition , Natural language understanding, Natural language generation, Machine Translation , Overview of Computer vision: image formation, image classification, image detection **Case Study 3** : Image annotation, image classification using Google Colab		
Unit 4	**Uncertainty In AI**	**12 hours**
Uncertainty in AI: conditional independence, Baye's rule, naive baye's model, Simple decision: utility function, decision network. Reinforcement learning: Active learning, Passive learning, Model Based Learning **Case Study 4:** Classification with Naive Bayes on Google Colab		
Unit 5	**Emerging in AI**	**12 hours**
Overview of ANN, Generative Adversarial Networks Chatbot, Gen AI, Overview of ChatGPT Ethics of AI, Future of AI **Case study 5:** Handwritten digit Recognition using ANN on Google colab		
	Total Lecture Hours	**60 hours**

Textbook:

1. NORVIG, P. R. (2021). Artificial intelligence: A modern approach, 4th edition, Pearson
2. Aurelien Geron (2023): Hands-On Machine Learning With Scikit-Learn, Keras & Tensorflow, 3rd Edition, O'Reilly

Reference Books:

1. Rajendra Aketkar, "Introduction to Artificial Intelligence" (E-book)

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
30	30	6	6	3	**75**	**150**
60		**15**				

Course Code: EC202L	**Course Name: Intelligent Health Care System**	**L**	**T**	**P**	**C**
		1	**0**	**0**	**1**

Pre-requisite: NA

Course Objectives:

1. Explore Fundamentals of Health Care and the Role of Intelligent Systems in Health Care System.
2. Realize Health Care Technologies with Emerging Trends and Innovations

Course Outcome: After completion of the course, the student will be able to

1. Apply the Fundamentals of Health Care Systems.
2. Explore the Role of Intelligent Systems in Health Care.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	1	-	1	-	-	-	1
CO2	3	3	2	2	1	1	-	1	-	-	-	1

Unit 1	**Introduction to Intelligent Health Care Systems**	**07 hours**
Cell and its structure – Resting and Action Potential – Nervous system and its fundamentals - Basic components of a biomedical system- Cardiovascular systems- Respiratory systems -Kidney and blood flow - Biomechanics of bone - Biomechanics of soft tissues - Basic mechanics of spinal column and limbs -Physiological signals and transducers - Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fiber optic temperature sensors.		
Unit 2	**Biomedical Devices and Future Trends**	**08 hours**
Demonstration and working mechanism of Biomedical device: Patient Monitor while covering essential physiology parameters such as ECG, BP, Heart Rate etc.		

Future Trends and Innovations: Emerging technologies in intelligent healthcare systems, Research directions and future possibilities.

Total Lecture Hours	**15 hours**

Textbook:

1. Leslie Cromwell, Biomedical Instrumentation and Measurement, Prentice Hall of India, New Delhi,2007.
2. M. Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.
3. Khandpur R.S, Handbook of Biomedical Instrumentation, , Tata McGraw-Hill, New Delhi, 2 Edition, 2003.

Reference Books:

1. John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons, NewYork, 1998.
2. Duane Knudson, Fundamentals of Biomechanics, Springer, 2nd Edition, 2007.
3. Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Care Systems, Technology and Techniques, Springer, 1st Edition, 2011.
4. Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, Third Edition, Boca Raton, CRC Press LLC, 2006.
5. Joseph J.carr and John M. Brown, Introduction to Biomedical Equipment Technology, John Wiley and sons, New York, 4th Edition, 2012.

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
20	20	4	4	2	-	**50**
40		**10**				

Course Code: EE102L	**Course Name: Explorations in Electrical Engineering**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

Pre-requisite: NA

Course Objectives:

1. Aim to Implement different circuits and verify circuit concepts for DC and AC circuits.
2. Aim to learn the basics of electrical machines.

Course Outcome: After completion of the course, the student will be able to

1. Understand the concepts of electric circuits with DC supply using mesh-nodal analysis and Network Theorems.
2. Apply the concepts of electrical circuits with AC supply in single and three phase system
3. Analyze the equivalent circuit and performance of single-phase AC transformer
4. Illustrate the working principle of induction motors, synchronous machines and DC machines.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	-	-	-	-	2
CO2	3	2	2	2	-	-	-	-	-	-	-	2
CO3	3	3	2	2	-	-	-	-	-	-	-	2
CO4	3	3	2	2	-	-	-	-	-	-	-	2

Unit 1	**DC Circuits**	**08 hours**

Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, Kirchhoff's laws, Loop and nodal methods of analysis, Superposition theorem and Thevenin's theorem.

Unit 2	**AC Circuits**	**07 hours**

Representation of Sinusoidal waveforms – Average and effective values, Form factor and peak factor, Concept of phasors, phasor representation of sinusoidal varying voltage and current. Analysis of single-phase AC Circuits consisting of R, L, C, RL, RC, RLC combinations (Series and Parallel), Apparent, active & reactive power and Power factor. Introduction to 3-phase AC Circuits.

Unit 3	**Magnetic Circuit and Transformer**	**07 hours**

Magnetic circuits and calculation related to simple magnetic circuits, Working principle of Transformer, EMF equation of transformer, Ideal and practical transformer, losses in transformers, Efficiency of Transformer. Introduction to Auto Transformer.

Unit 4	**Introduction to Electrical Machines**	**08 hours**

Introduction to DC Machines, Types of DC Machines, Working principle of three phase Induction Motor and concept of slip, Toque- slip characteristics, Different starting methods of 1-phase induction motor. Working principle of Synchronous motor.	
Total Lecture Hours	**30 hours**

Textbook:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. Hughes, E., Smith, I.M., Hiley, J. and Brown, K., "Electrical and Electronic Technology", PHI (2008)
3. P.V. Prasad, S. Sivanagaraju, "Electrical Engineering: Concepts and Applications" Cengage, 2018.

Reference Books:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
3. V. D. Toro, "Electrical Engineering Fundamentals", Pearson India, 2018.

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
20	20	4	4	2	**50**	**100**
40		**10**				

Course Code: EE104L	**Course Name: Digital Logic Design**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

Pre-requisite: Introduction to Computers

Course Objectives:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To implement simple logical operations using Minimization Techniques.
3. To design combinational logic circuits.
4. To design sequential logic circuits.

Course Outcome: After completion of the course, the student will be able to

1. Understand various types of number systems and their conversions.
2. Simplify the Boolean expressions and apply the Boolean theorems through logical gates.
3. Design and implement variety of logical devices using combinational circuits concepts.
4. Analyze sequential circuits like Registers and Counters using flip-flops.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	-	-	-	-	2
CO2	3	2	2	2	-	-	-	-	-	-	-	2
CO3	3	3	2	2	-	-	-	-	-	-	-	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3

Unit 1	**Number System and Boolean Algebra**	**08 hours**

Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal Code and its Properties, Unit Distance Codes, Error Detecting and Correcting Codes. Digital Logic Gates (AND,NAND,OR,NOR,EX-OR,EX-NOR), Properties of XOR Gates, Universal Gates, Basic Theorems and Properties, Switching Functions, Canonical and Standard Form.

Unit 2	**Minimization Techniques**	**08 hours**

Introduction, The minimization with theorems, The Karnaugh Map Method, Three, Four and Five variable K- Maps, Prime and Essential Implications, Don't Care Map Entries, Using the Maps for Simplifying, Quine-McCluskey Method, Multilevel NAND/NOR realizations.

Unit 3	**Combinational Circuits**	**07 hours**

Design Procedure – Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel Binary Adder, Parallel binary subtractor, Binary Multiplier, Multiplexers/De-Multiplexers, decoder, Encoder, Code Converters, Magnitude Comparator. Classification of sequential circuits, The binary cell, The S-R-Latch Flip-Flop The D-Latch Flip-Flop, The "Clocked T" Flip-Flop, The "Clocked J-K" Flip-Flop, Design of a Clocked Flip-Flop, Timing and Triggering Consideration.

Unit 4	**Sequential Circuits**	**07 hours**

Introduction, Basic Architectural Distinctions between Combinational and Sequential circuits, Latches, Flip-Flops, SR,JK,D,T and Master slave, characteristic Tables and equations, Conversion from one type of Flip-Flop to another, Counters - Design of Single Mode Counter, Ripple Counter, Ring Counter, Shift Register, Ring counter using Shift Register.

Total Lecture Hours	**30 hours**

Textbook:

1. Digital Logic and Computer Design by M. Moris Mano, 4th Edition.
2. Digital Principles and Applications by Leach, Paul Malvino, 5th Edition.

Reference Books:

1. Fundamentals of Digital Logic Design by Charles H.Roth, Jr. 5th Edition, Cengage
2. Digital Electronics by G.K. Kharate, Oxford University Press
3. Switching Theory and Logic Design by A. Anand Kumar, PHI, 2nd Edition

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**	**50**	**100**
20	20	4	4	2		
40		**10**				

Course Code: EE103B	**Course Name: Emerging Technologies for Engineers**	**L**	**T**	**P**	**C**
		2	**0**	**2**	**3**

Pre-requisite: Basics of IoT

Course Objectives:

1. To introduce students to the evolution and integration of cutting-edge technologies that influence the design, operation, and sustainability of contemporary engineering systems.
2. To provide foundational knowledge in Industry 5.0, smart and sustainable technologies, and essential digital tools such as MATLAB, IoT, and Artificial Intelligence.

Course Outcome: After completion of the course, the student will be able to

1. Understand the concepts of Industry 1.0 to Industry 5.0 & 5G technology
2. Apply basic MATLAB programming and Simulink for modeling, simulation and data visualization.
3. Understand the role and applications of smart and sustainable technologies in engineering systems.
4. Understand the foundational concepts of AI, ML, and cloud computing

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	-	-	-	-	2
CO2	3	2	2	2	-	-	-	-	-	-	-	2
CO3	3	3	2	2	-	-	-	-	-	-	-	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3

Unit1	**Evolution of Industrial Revolutions**	**15 hours**

Evolution of industrial revolutions: From Industry 1.0 to Industry 5.0. Definition and components of Industry 5.0. Introduction to IoT and its role in Industry 5.0. Role of 5G technology in enabling new applications.

Hands-on/Case Study/ Mini-Project/ Problem solving:

Introduction to emerging software's related to electrical and mechanical (MATLAB, Simulink, ETAP, AutoCAD, PVsyst, LabVIEW, Homer, and Python for Hardware).

Unit 2	**MATLAB for Engineering Applications**	**15 hours**

Importance of MATLAB in Engineering. MATLAB Programming basics, arrays, and functions. Matrix operations, plotting, and visualization tools. MATLAB Simulink basics for system modelling and simulation. Interfacing MATLAB with hardware (Arduino or DAQ).

Hands-on/Case Study/ Mini-Project/ Problem solving:

1. Introduction to MATLAB environment: Basic operations, variables, and expressions
2. Arrays and matrix manipulation in MATLAB
3. Plotting 2D and 3D graphs using MATLAB (line, surface, bar plots)
4. Developing a Simulink model for a second-order Electrical or Mechanical system.

To acquire data from sensors using MATLAB

Unit 3	Smart and Sustainable Technologies	15 hours

Introduction to smart systems: Smart cities, smart homes, intelligent transport. Green technologies in energy: Solar, wind, and hybrid systems. Applications: Smart grid, waste management and energy monitoring.

Hands-on/Case Study/ Mini-Project/ Problem solving:

1. To generate data for real world using MATLAB.
2. To log sensor data and perform analysis using MATLAB.
3. To create a real-time dashboard for visualizing IoT data using MATLAB.

Interfacing a temperature/voltage sensor with Arduino and MATLA

Unit 4	Future Technologies	15 hours

Overview of Artificial Intelligence (AI), Machine Learning (ML), and their applications. Definition and characteristics of cloud computing. Evolution of cloud computing. Cloud architecture and key components. Ethical implications of emerging tech.

Hands-on/Case Study/ Mini-Project/ Problem solving:

1. Real-Time Solar Parameter Monitoring using MATLAB and ThingSpeak.
2. Real-Time Water Level Monitoring using Ultrasonic Sensor and ThingSpeak.
3. Air Quality Monitoring System using Arduino, MQ Sensor, and ThingSpeak
4. Energy Consumption Prediction Using Historical Data in MATLAB Integrated with ThingSpeak.

Smart Irrigation System with Weather Forecasting Using Arduino, MATLAB, and ThingSpeak.

	Total Lecture Hours	60 hours

Textbook:

1. K. Kumar and J. P. Davim, Industry 5.0: A Human-Centric Solution. Boca Raton, FL: CRC Press, 2021.
2. S. Attaway, MATLAB: A Practical Introduction to Programming and Problem Solving, 5th ed. Cambridge, MA: Elsevier, 2023.
3. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, 4th ed. Boston, MA: Pearson, 2022.

Reference Books:

1. R. Kamal, Internet of Things: Architecture and Applications. New Delhi, India: McGraw-Hill Education, 2019.
2. R. Pratap, Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, 3rd ed. New York, NY: Oxford University Press, 2016.

Mode of Evaluation

Evaluation Scheme						
MSE		CA			ESE	Total Marks
MSE 1	MSE 2	CA1	CA2	CA3(ATT)	75	150
30	30	6	6	3		
60		15				

Course Code: EC208L	Course Name: Digital Logic Design using HDL	L	T	P	C
		2	0	0	2

Pre-requisite: Basics of IoT

Course Objectives:

1. To introduce students to the fundamentals of digital system design and the use of Hardware Description Languages (HDLs) for modelling and simulation of digital circuits.
2. To develop the ability to design, simulate, and implement combinational and sequential digital circuits using Verilog or VHDL.

Course Outcome: After completion of the course, the student will be able to

1. Understand fundamentals of HDL
2. Apply the concept of HDL for designing Combinational circuits.
3. Apply the concept of HDL for designing sequential circuits.
4. Design of complex digital systems.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2	3	-	-	-	-	-	-	2
CO2	2	3	2	2	3	-	-	-	-	-	-	2
CO3	2	3	2	2	3	-	-	-	-	-	-	2

Unit 1	Introduction to HDL & Digital Design Concepts	8 hours
Review of Digital Logic: Logic gates, combinational and sequential logic, Introduction to Hardware Description Languages: VHDL vs. Verilog. HDL Design Flow and Simulation vs. Synthesis, Entity-Architecture Model (VHDL) / Module Concept (Verilog), Structural, Dataflow, and Behavioral modelling, Simulation Tools Overview		
Unit 2	**Combinational Logic Design using HDL**	**8 hours**
Data flow, Gate level, behavioural and switch level modelling. Combinational circuit design - Half adder and Full adder Arithmetic Circuits Multiplexers, Decoders and Encoders.		
Unit 3	**Sequential Circuit Design using HDL**	**8 hours**
Design examples for Flip flops, Synchronous counters, Asynchronous counters, Shift registers.		
Unit 4	**Complex Designs Using HDL**	**6 hours**
ALU Design, Finite State Machines, Moore versus Mealy Machines, Booth multiplier.		
	Total Lecture Hours	**30 hours**

Textbook:

1. Charles H. Roth, Digital systems design using VHDL, Thomson, 2008.
2. Samir palnitkar, "Verilog HDL", Pearson education, Second Edition,20O3.
3. Volnei A. Pedroni, "Circuit Design with VHDL" MIT Press, 2004.
4. Jayaram Bhasker, A VHDL Primer, 3rd edition., Prentice Hall, 2011

Reference Books:

1. Botros, Nazeih M. *HDL programming VHDL and Verilog*. dreamtech press, 2006.
2. Michael D. Ciletti, Advanced Digital Design with Verilog HDL, Second Edition, Pearson,2011
3. M. Morris Mano, "Digital Design," 5th Edition, Pearson Education India, 2012.

Mode of Evaluation

Evaluation Scheme						
MSE		CA			ESE	Total Marks
MSE 1	MSE 2	CA1	CA2	CA3(ATT)	50	100
20	20	4	4	2		
40		10				

Course Code: EC209B	Course Name: Basic Electronics Engineering	L	T	P	C
		1	0	2	2

Pre-requisite: NA

Course Objectives:

1. To introduce the fundamental principles and applications of semiconductor devices, including diodes, BJTs, and MOSFETs in electronic circuits.
2. To develop analytical and design skills for basic analog circuits, such as amplifiers, voltage regulators, and signal shaping circuits.
3. To equip students with the ability to model, analyze, and interpret the small-signal behavior of electronic components, enabling circuit performance evaluation and troubleshooting.

Course Outcome: After completion of the course, the student will be able to

1. Design the diode-based voltage limiter and regulator circuits
2. Analyse the biasing techniques to stabilize the operating conditions of BJT and BJT as an amplifier.
3. Analyse the biasing techniques to stabilize the operating conditions of MOSFET and MOSFET as an amplifier.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	2	-	-	-	-	-	-	2
CO2	3	3	2	2	2	-	-	-	-	-	-	2
CO3	2	3	2	2	2	-	-	-	-	-	-	2

Unit 1	Diode Circuits	10 hours
Fundamentals of diode, Diode based circuits, clippers, clampers, voltage multipliers, peak detectors, half/full wave rectifiers, diode as gate, Zener diode voltage regulators, Varactor diode, Small Signal analysis of diode circuits.		
Unit 2	**BJT**	**10 hours**
Working operation of BJT, input & output characteristics of BJT, base Width Modulation effect, Load Line Analysis, DC Operating Points, Need of Biasing, current/voltage mode biasing, Fixed Bias Circuits, Self-Bias Circuits, Voltage Divider		

Bias Circuits, Stability Factor, Thermal Runaway, Thermal Stability, BJT as an amplifier and switch.

Unit 3	**MOSFET**	**10 hours**

Working operation of MOSFET, Drain and Transfer characteristics of MOSFET, Chanel length Modulation effect, Load Line Analysis, DC Operating Points, Need of Biasing, current/voltage mode biasing, Fixed Bias Circuits, Self-Bias Circuits, Voltage Divider Bias Circuits, MOSFET as an amplifier and switch.

Practical	**15 hours**

Student should perform and simulate the following experiments using **Cadence Simulation Tool.**

1. To verify diode Characteristic using Cadence.
2. Design and simulation of rectifier circuits.
3. Design and simulation of Clipper circuits.
4. Design and simulation of Clamper circuits.
5. Design of simulation of Zener diode as Voltage Regulator.
6. To verify the input and output characteristics of BJT.
7. Design and simulation of BJT as a switch and an inverter.
8. To verify the drain and transfer characteristics of MOSFET.
9. Design and simulation of MOSFET as a switch and an inverter.
10. Mini Project

Total Lecture Hours	**45 hours**

Textbook:

1. R. L. Boylestad and L. Nashlesky, "Electronics Device & Circuits Theory", PHI, 11th Edition, 2015
2. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Oxford Publishing House, 7th Edition, 2017
3. B. Razavi, “Fundamental of Microelectronics”, 3rd Edition, Wiley India, 2021

Reference Books:

1. J. Millman and C. Halkias, "Integrated Electronics", McGraw-Hill, 2nd Edition, 2017.
2. D. A. Neamen, “Microelectronic: Circuits, Analysis & Design”, McGraw Hill, 4th Edition, 2021.
3. J. Milman and A. Grabel, Microelectronics, McGraw Hill, 2nd Edition, 2017.

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
20	20	4	4	2	**50**	**100**
40		**10**				

Course Code: MA104L	**Course Name: Differential Equations & Complex Integration**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**

Pre-requisite: X+2

Course Objectives:

1. The objective of this course is to learn the techniques for solving ordinary and partial differential equations related to physical phenomena such as heat conduction, wave propagation.
2. Equipping the skills of transformation and series helps to analyse system behaviour and describe physical phenomena to both theoretical and practical problems in various fields.

Course Outcome: After completion of the course, the student will be able to

1. Apply the knowledge to solve ordinary and higher order differential equations used in Engineering problems.
2. Apply the concept of Laplace transforms techniques to solve ordinary differential equations.
3. Apply the concept of periodic function to find Fourier series and Fourier half range series.
4. Employ the concept of Partial Differential Equations in heat, wave and Laplace equation.
5. Apply the knowledge of complex integration to solve integrals and expansion of complex function.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	1	-	-	-	1	-	-	-	1
CO2	2	2	2	1	-	-	-	1	-	-	-	1
CO3	2	2	2	1	-	-	-	1	-	-	-	1

CO4	2	2	2	1	-	-	-	1	-	-	-	1

Unit 1	Ordinary Differential Equation of Higher Order	09 hours

Linear differential equation of nth order with constant coefficients, Cauchy-Euler equation, solution of second order linear differential equations by the method of variation of parameters.

Unit 2	Laplace Transform	09 hours

Laplace Transform of some standard functions, I and II Shifting theorems (without proof), Change of Scale Property, Laplace transform of derivatives and integrals, Inverse Laplace Transform, Convolution theorem (without proof), Application of Laplace transform to solve ordinary differential equation.

Unit 3	Fourier Series	09 hours

Periodic function, even and odd function, Fourier series expansion of a function in the interval c to $c+2l$.
Half Range Series: Half range sine and cosine series in the interval $-l$ to l .

Unit 4	Partial Differential Equation	09 hours

Introduction to partial differential equation, solution of partial differential equation by the method of separation of variables, solution of one-dimensional wave and heat equations, two-dimensional heat equation (only Laplace equation).

Unit 5	Complex Variable –Integration	09 hours

Complex integrals, Cauchy-Integral theorem (without proof), Cauchy integral formula (without proof), Taylor's series and Laurent's series, Singularities

Total Lecture Hours	45 hours

Textbook:

1. B S Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, McGraw-Hill Publishing Company Ltd., 2008.
3. R K. Jain & S R K. Iyenger, Advance Engineering Mathematics, Narosa Publishing House 2002.
4. N. P Bali, Engineering Mathematics 4 PDE & Statistics.
5. M. D. Raisinghania: Ordinary and Partial Differential Equations (S. Chand).

Reference Books:

1. Peter V. O'Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
3. Sheply L. Rose: Differential Equations (Wiley India).

Mode of Evaluation

Evaluation Scheme						
MSE		CA			ESE	Total Marks
MSE 1	MSE 2	CA1	CA2	CA3(ATT)		
40	40	8	8	4	100	200
80		20				

Course Code: ME102L	Course Name: Engineering Mechanics	L	T	P	C
		2	0	0	2

Pre-requisite: NA

Course Objectives:

1. To make the students understand the force systems, free body diagram to analyse rigid body equilibrium.
2. To understand the concept of friction and trusses.
3. To learn the concept of centroid, first moment and second moment of an area.
4. To understand the concept of motion of particles and rigid bodies.

Course Outcome: After completion of the course, the student will be able to

1. Understand shear forces and bending moments for different beam configurations and loading conditions.
2. Analyze truss structures using the methods of joints and sections and demonstrate a thorough understanding of friction types and laws.
3. Apply first principles and theorems to calculate centroids, centers of gravity and moments of inertia for area and masses.
4. Apply the principles of kinematics and kinetics of rigid bodies.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	1	-	-	1	-	-	-	-	-	2

CO2	3	2	2	-	-	1	-	-	-	-	-	2
CO3	3	-	2	-	-	1	-	-	-	-	-	2
CO4	3	-	2	-	-	1	-	-	-	-	-	2

Unit 1	**Introduction to Beams**	**08 hours**

Basic concepts, Shear Force and Bending Moment Diagram for Cantilever Beam, Simply Supported Beam and Overhanging Beam with Concentrated Load, Distributed Load and Couple, Relation Between Shear Force and Bending Moment, Case study on practical applications of different beams and its loadings.

Unit 2	**Analysis of Structures**	**07 hours**

Types of truss and assumptions, Analysis of plane trusses by method of joints and method of section, Case study of truss applied to different type of structures.

Friction - Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Impending motion of Bodies, Practical applications of friction in different machines.

Unit 3	**Centroid and Centre of Gravity**	**07 hours**

Centroid from first principle, centroid of composite sections; Centre of Gravity from first principle, Centre of Gravity of composite sections.

Moment of Inertia –Area moment of inertia, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of composite sections; Mass moment of inertia of circular plate, Cylinder, Cone, Sphere, Radius of Gyration. Case study on practical applications of CG and MI.

Unit 4	**Kinematics of rigid body**	**08 hours**

Basic terms, Types of motion, plane motion of rigid body, velocity and acceleration under translational, rotational motion and general principles in dynamics; Instantaneous center of rotation in plane motion, relative velocity. Practical examples and real-life applications of concept.

Kinetics of rigid body – D'Alembert's principle and its applications in plane motion and connected bodies; Impulse-Momentum principle, Work-energy principle and its application in plane motion of connected bodies; Kinetics of rigid body in rotation, Practical examples and real life applications of concept.

	Total Lecture Hours	**30 hours**

Textbook:

1. Engineering Mechanics by S SBhavikatti, 7th Multi colour Edition.
2. Engineering Mechanics, R.K. Bansal, Laxmi Publications.
3. Engineering Mechanics, R.S. Khurmi, S.Chand Publishing.

Reference Books:

1. Meriam J.L. and Kraige L.G., Engineering Mechanics-Statics-Volume 1, Dynamics-Volume 2, Third Edition, John Wiley & Sons (1993).
2. Mechanics of Materials by James M. Gere and Barry J. Goodno
3. Structural Analysis by Russell C. Hibbeler
4. Mechanics of Materials by Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf, and David F. Mazurek

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
20	20	4	4	2	**50**	**100**
40		**10**				

Course Code: ME103L	**Course Name: Fundamentals of Mechatronics and Industrial Automation**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

Pre-requisite: NA

Course Objectives:

1. To explain the fundamentals, scope, and interdisciplinary nature of Mechatronics.
2. To identify various mechanical, electrical, pneumatic, and hydraulic components of Mechatronic systems.
3. To illustrate the working principles of various sensors and actuators used in automation.
4. To introduce industrial automation and the basics of PLCs.

Course Outcome: After completion of the course, the student will be able to

1. Explain the fundamentals, scope, and interdisciplinary nature of Mechatronics and its applications in modern industries.
2. Identify and describe key mechanical, electrical, pneumatic, and hydraulic components used in Mechatronic systems.
3. Illustrate the working principles and applications of various sensors and actuators and evaluate their suitability for specific applications.
4. Understand the basics of industrial automation, types of control devices, and the concept of PLCs with real-world industrial examples.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	3	-	-	-	-	2	-	2
CO2	2	-	2	-	2	-	-	-	-	-	-	2
CO3	2	-	2	-	3	-	-	-	2	2	-	2
CO4	-	-	-	-	2	-	-	-	2	2	-	3

Unit1	**Fundamentals of Mechatronics**	**7 hours**

Definition, scope, and evolution of Mechatronics, Need for automation and mechatronics in industry, Interdisciplinary approach and integration of subsystems, Block diagram of mechatronic systems with real-life examples, Applications in consumer products, automobiles, robotics, manufacturing.

Unit 2	**Elements of Mechatronic Systems**	**8 hours**

Mechanical elements: gears, cams, bearings, belts, levers, couplings, Electrical and electronic components: switches, relays, solenoids, diodes, Pneumatic and hydraulic basics: compressors, cylinders, valves, Interfacing of elements in simple systems, Case studies: automatic door system, domestic appliances.

Unit 3	**Sensors and Actuators**	**8 hours**

Classification and characteristics of sensors, Working principles and uses of: Inductive, capacitive, photoelectric, ultrasonic, temperature, LVDT, Actuators: electrical (DC/AC motor, servo, stepper), hydraulic and pneumatic, Selection criteria for sensors and actuators

Unit 4	**Introduction to Industrial Automation and Control Devices**	**7 hours**

Definition and levels of automation, Types of automation: Fixed, Programmable, and Flexible, Basic control devices: timers, counters, relays, Introduction to PLC (conceptual level only – what it is, where it is used), Industrial examples: bottle filling system, conveyor belt sorting system.

Total Lecture Hours	**30 hours**

Textbook:

1. W. Bolton, Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, Pearson Education.
2. N.P. Mahalik, Mechatronics: Principles, Concepts and Applications, Tata McGraw Hill.

Reference Books:

1. R.K. Rajput, A Textbook of Mechatronics, S. Chand & Company.
2. M.D. Singh & J.G. Joshi, Mechatronics, PHI Learning Pvt. Ltd.

Mode of Evaluation

Evaluation Scheme						
MSE		**CA**			**ESE**	**Total Marks**
MSE 1	**MSE 2**	**CA1**	**CA2**	**CA3(ATT)**		
20	20	4	4	2	**50**	**100**
40		**10**				

3. Practical's Courses Detail Syllabus

Course Code: PH101P	Course Name: Semiconductor Physics and Devices Lab	L	T	P	C
		0	0	2	1

Pre-requisite: NA

Course Objectives:

To impart the experimental knowledge of semiconductor Physics and devices to engineering graduates so that they are able to assess and contribute to the solution of technical and engineering problems that are based on broad principles of Physics including solid state physics, semiconductors and optoelectronics devices.

Course Outcome: After completion of the course, the student will be able to

1. Illustrate the basic concept of crystalline materials and their appropriate use.
2. Apply the fundamentals of basic semiconductor Physics on transistor and MOSFET.
3. Apply the concepts of semiconductor Physics in aspect of solar cell and Zener diode.
4. Implementing of semiconductor Physics to study various characteristics of optoelectronic devices.
5. Apply the concept of Quantum Physics to study various phenomenon.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	-	-	-	-	1	2	2	-	1
CO2	2	2	-	-	-	-	-	1	2	2	-	1
CO3	2	2	-	-	-	-	-	1	2	2	-	1
CO4	2	2	-	-	-	-	-	1	2	2	-	1
CO5	2	1	-	-	-	-	-	-	1	2	-	1

List Of Practical's (Indicative & Not Limited To)

1. To determine the wavelength of Laser light using diffraction phenomena.
2. To study the characteristics of NPN/PNP transistors.
3. To study the V-I characteristics and power output characteristics of the solar cell and show the maximum power point on graph and calculate fill factor.
4. To determine the energy band gap of a given semiconductor material by four probe method.
5. To study the presence of discrete energy levels in an atom by Franck Hertz experiment.
6. To study the Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor using Hall Effect set up.
7. To study the V-I characteristics of MOSFET.
8. To plot the graph of V-I characteristics of a Zener diode.
9. To find the fiber attenuation and numerical aperture of a given optical fibre.
10. To determine Planck's constant and work function using Photo-electric effect.

Total Hours: 30 hours

Mode of Evaluation

CA1	CA2	ESE	Total
12	13		
25		25	50

Course Code: EC201P	Course Name: Computer Organization & Logic Design Lab	L	T	P	C
		0	0	2	1

Pre-requisite: NA

Course Objectives:

1. Explore the basics of digital logic, including number systems and logic gates.
2. Perform the analysis and design of various digital electronic circuits.
3. Explore the knowledge of Computer organization and memory concepts.
4. Work in a team to demonstrate an application of digital circuits by engaging in self-learning.

Course Outcome: After completion of the course, the student will be able to

1. Apply the basics of binary arithmetic and codes in digital system design.
2. Design combinational logic circuits using Boolean functions and gate-level minimization
3. Design sequential logic circuits, including latches, flip-flops, registers, and counters.
4. Understand computer organization, including bus architecture, processor organization, and I/O systems.
5. Understand memory organization, cache, and virtual memory.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	1	-	-	-	-	-	-
CO2	3	3	2	2	1	1	-	-	-	-	-	-
CO3	3	3	2	2	1	1	-	-	-	-	-	-
CO4	3	3	2	2	2	2	-	-	-	-	-	-
CO5	3	3	2	2	1	1	-	-	-	-	-	-

List Of Practical's (Indicative & Not Limited To)

1. Investigate logic behavior of AND, OR, NOT, NAND, EX-OR, EX NOR Gates. Realization of Boolean Expressions using Gates and minimization using Karnaugh Map.
2. Design and verification of the truth tables of Half, Full adder.
3. Design and verification of truth table of decoder and multiplexer circuits.
4. Design and implement 2- bit magnitude comparator.
5. Verification of truth tables of SR, J-K, and D Flip-Flops.
6. Design and verify all types of Shift Registers.
7. Design and verify the 2-Bit Synchronous and Asynchronous Counter.
8. Design memory units (single bit RAM cell) and understand how it operates during read and write operation.

Total Hours: 30 hours

Mode of Evaluation

CA1	CA2	ESE	Total
12	13		
25		25	50

Course Code: IT101P	Course Name: Programming for Problem Solving Lab	L	T	P	C
		0	0	4	2

Pre-requisite: NA

Course Objectives:

1. Given a computational problem, identify and abstract the programming task involved.
2. Approach the programming tasks using techniques learned and writepseudo-code.
3. Choosethe right data representation formats based on the requirements of the problem.
4. Use comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
5. By learning the basic programming constructs, students can easily switch over to any other language in future.

Course Outcome: After completion of the course, the student will be able to

1. Apply programming constructs of C language to solve real-world problems.
2. Use the concepts of looping, branching, and decision-making statements for a given problem.
3. Develop Solutions to problems using modular programming constructs such as functions and recursion.
4. Demonstrate the ability to write C programs using pointers, strings structures and unions.
5. Design a solution to problems using the concepts of pointers and files handling.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	2	-	-	1	-	-	-	2
CO2	3	3	-	2	2	-	-	1	-	-	-	2
CO3	3	3	-	2	2	-	-	1	-	-	-	2
CO4	3	3	2	2	2	-	-	1	-	-	-	2
CO5	3	3	2	2	2	-	-	1	-	-	-	2

List Of Practical's (Indicative & Not Limited To)

1.
   a. Write a C program to input two integer numbers and perform addition, subtraction, division and multiplication.

b. Accept any two numbers, if the first number is greater than the second then print the sum of these two numbers, otherwise print their difference. Write this program using the ternary operator.
c. Write a program to accept the principal, rate, and number of years and find out the simple interest and compound interest.
d. Write a C program to swap values of two variables with the help of a third variable and without using a third variable.
e. Write a C program allows the user to input a floating-point number. The program then extracts an integral part of the number and finds its rightmost digit. By utilizing suitable algorithms and logic, the program accurately identifies the digit at the furthest right position in an integral part of the given number.
f. Write a C program to add two numbers together without utilizing the conventional + operator. The program employs alternative techniques and logical operations to achieve the addition operation. By leveraging bitwise operations, such as bitwise XOR (^) and bitwise AND (&), along with bit shifting, the program cleverly performs the addition operation on each bit of the two numbers.
g. Write a C program to determine whether a given year is a leap year or not using the conditional operator. The program takes advantage of the conditional (ternary) operator?:, which allows for concise conditional expressions. The leap year check is performed based on the following criteria: a year is a leap year if it is divisible by 4, but not divisible by 100 unless it is also divisible by 400.
h. Write a C program to multiply two given numbers without using the * operator. The program takes advantage of the concept of repeated addition to perform multiplication. It prompts the user to input two numbers and utilizes a loop to iteratively add the first number to a running sum until the second number is reached.
i. Write a C program to determine the largest among three given numbers using the conditional operator (?:).The program prompts the user to input three numbers and utilizes the conditional operator to compare and determine the largest number among them.

2.

a. Write a menu-driven program using the Switch case to calculate the following:
   - Addition of two numbers
   - Difference between two numbers
   - Product of two numbers
   - Division of two numbers
   - HCF of two numbers
   - LCM of two numbers
b. Write a program to input an integer number and check whether it is prime or not.
c. Write a program to print prime numbers between 1 to 100.
d. Write a program to find reverse of a number and check whether it is palindrome or not.
e. Write a program to find the sum of the series given below:
   - $x - x^3/3! + x^5/5! - x^7/7! +$------- up to n terms.
   - $1 + (1+2) + (1+2+3) + (1+2+3+4) +$------- up to n terms.
f. Write a C program to check whether all the bits of a given number are unset or low. The program prompts the user to input a number and uses bitwise operators and logical operations to perform the check. The program utilizes the bitwise AND (&) operator with a bit mask that has all bits set to 0 except for the bit in the position being checked. By performing the bitwise AND operation between the number and the bit mask for each bit position, the program determines if the bit is unset or low.
g. Write a C program to read a list of integers using a loop and calculate the number of distinct prime factors for each integer in the list. The program prompts the user to input the number of integers they want to enter, followed by the actual integers. It then utilizes loops, conditional statements, and a prime factorization algorithm to determine the distinct prime factors for each integer.
h. Write a C program to address the scenario where a company decides to give bonuses to its employees on the occasion of the new year. The program allows the user to enter the salary and gender of each employee and calculate the bonus based on the specified criteria. It also displays the final salary that each employee will receive, taking into account the applicable bonuses To calculate the bonus, the program uses conditional statements based on the employee's gender and salary. If the employee is male, a 5% bonus is applied to the salary. If the employee is female, a 10% bonus is applied. Additionally, if the salary is less than 10000, an extra 2% bonus is given to the employee. The program applies these bonuses using appropriate calculations and stores the final salary in a variable.
i. Write a C program to print the following pattern:

```
                1
            1   2   3
        1   2   3   4   5
    1   2   3   4   5   6   7
1   2   3   4   5   6   7   8   9
    1   2   3   4   5   6   7
        1   2   3   4   5
            1   2   3
                1
```

j. The task at hand is to write a C program that displays a specific pattern. The pattern consists of a series of numbers arranged in a triangular shape. Each row of the pattern follows the ascending and descending order of numbers:

```
      1
    1 2 1
  1 2 3 2 1
1 2 3 4 3 2 1
1 2 3 4 5 4 3 2 1
```

3.

a. The task at hand is to design a simple calculator program that will assist a doctor in examining the performance of a 13-year- old boy with exceptional mental math skills. The program will allow the doctor to input two numbers and choose an operation (addition, subtraction, multiplication, or division) to be performed on those numbers. The program will prompt the doctor to enter the two numbers and provide a menu of available operations. Based on the doctor's selection, the program will perform the chosen operation on the input numbers and display the result.

b. The task at hand is to design a program in C that converts a decimal number to its binary representation using a function. The program will prompt the user to enter a decimal number, and then it will call the conversion function to convert the decimal number to binary. The conversion function will take the decimal number as input and perform the necessary calculations to generate its binary equivalent. It will employ mathematical operations, such as division and modulus, to extract the binary digits. The function will store the binary digits in an array or a string, representing the binary number. The program should handle various scenarios, such as positive decimal numbers, negative decimal numbers, and zero, while accurately converting them to binary. It should also handle any potential errors or limitations, such as exceeding the range of data types used for storing the decimal and binary numbers.

c. The task at hand is to design a program in C that counts the occurrence of each digit in a given number using recursion. The program will prompt the user to enter a number, and then it will call a recursive function to count the occurrence of each digit in that number.

d. Write a C program that multiplies two matrices using recursion. The program prompts the user to enter the dimensions and elements of two matrices. It then recursively computes the product of the two matrices and displays the resulting matrix. To perform matrix multiplication using recursion, the program defines a recursive function. This function takes the two matrices, their dimensions, and the current row and column indices as parameters. At each recursive call, the function multiplies the corresponding row of the first matrix with the corresponding column of the second matrix and calculates the sum of the products.

e. The task is to write a C program that calculates the sum of a series using a function. The series is defined as follows: x - (x^3 / 3!) + (x^5 / 5!) - (x^7 / 7!) + (x^9 / 9!) + ... (up to n terms)
Here, 'x' is a given input value, and 'n' represents the number of terms in the series. To solve this task, the program will define a function that takes 'x' and 'n' as parameters and returns the sum of the series. The function will use a loop to iterate through the terms of the series and calculate the value of each term based on the given formula. The sum of all the terms will be accumulated and returned as the final result. The program will also prompt the user to enter the values of 'x' and 'n', and then it will call the function to compute the sum of the series. Finally, the program will display the result to the user.

f. The program is designed to calculate and print a table of binomial coefficients using the provided formula. Binomial coefficients, denoted as B(m, x), are calculated using the formula B(m, x) = m! / (x! * (m - x)!), where m is the total number of elements, and x is the number of elements chosen at a time. The program prompts the user to enter the values of 'm' and 'x'. It then calculates the binomial coefficient for each combination of 'm' and 'x' that satisfies the condition m > x. The factorial function is used to calculate the factorials involved in the formula. The program generates a table displaying the binomial coefficients for the given range of 'm' and 'x'. The table is printed in a formatted manner, making it easy to read and understand. Each row of the table corresponds to a specific 'm' value, and the columns represent the corresponding 'x' values. The table provides a comprehensive view of the binomial coefficients, showing the number of ways to choose 'x' elements from a set of 'm' elements. This information can

be useful in various mathematical and statistical calculations, such as combinatorics, probability, and algebraic equations.

4.

a. The C program is designed to find the median of two sorted arrays. It takes two input arrays, both of which are assumed to be sorted in ascending order. The program determines the median value by combining the elements from both arrays and finding the middle value(s) in the merged array. To achieve this, the program follows a divide-and-conquer approach. It calculates the midpoints of the two arrays and compares the corresponding elements at those positions. Based on the comparison, it discards the elements that are guaranteed to be less than the median. The process continues recursively until the median is found. If the total number of elements in the combined array is odd, the median is the middle element. If the total number of elements is even, the median is the average of the two middle elements.

b. The program aims to find the largest number in an array using recursion. It takes an array of integers as input and recursively searches for the largest number within the array. The program uses a recursive function to compare elements of the array. It starts by assuming the first element of the array is the largest. Then, it recursively compares this assumed largest number with the remaining elements of the array. If a larger number is found, it becomes the new assumed largest number. This process continues until all elements of the array have been compared.

c. The program aims to find the nearest lesser and greater elements in an array based on a given target number. The user is prompted to enter the size of the array and the array elements. Additionally, the user provides a target number for comparison. The program then determines the nearest lesser and greater elements in the array in relation to the target number. The algorithm begins by initializing the nearest lesser and greater variables as the minimum and maximum possible values, respectively. It iterates through each element of the array, comparing it with the target number. If the element is smaller than the target number and greater than the current nearest lesser value, it becomes the new nearest lesser. Similarly, if the element is larger than the target number and smaller than the current nearest greater value, it becomes the new nearest greater.

d. The task is to write a C program that removes duplicate elements from an array. Given an array containing integers, the program should identify and eliminate any duplicate elements, leaving only the unique elements in the array. The program should modify the original array in-place and update its size accordingly. The program will iterate through the array and compare each element with the remaining elements in the array. If a duplicate element is found, it will be removed by shifting the subsequent elements to the left, effectively overwriting the duplicate element. The size of the array will be reduced by one for each duplicate element encountered.

e. The task is to write a C program that sorts a list of names in alphabetical order. Given an array of strings representing names, the program should rearrange the names such that they are sorted in ascending order based on the alphabetical order. The program will use a sorting algorithm to compare pairs of names and swap them if they are out of order. It will continue this process until the entire list is sorted. The sorting algorithm can be implemented using various techniques such as bubble sort, insertion sort, selection sort, or more efficient algorithms like quicksort or merge sort.

f. The task is to write a C program that reads a string from the user and uses a function to reverse the order of words in the string. The program will prompt the user to enter a string and then call a function to reverse the order of the words in the string. The program will analyze the input string and identify the words based on spaces or any other specified delimiters. It will then reverse the order of these words while maintaining the order of the characters within each word. For example, if the input string is "Hello World, how are you?", the program will reverse the words to form the output string "you? are how World, Hello". The program will implement the logic to reverse the words by using string manipulation techniques such as splitting the string into words, storing them in an array, and then rearranging the words in reverse order. It will handle cases where there are multiple spaces between words and ensure that the resulting string maintains the original spacing. After reversing the order of the words, the program will display the modified string to the user. The reversed string will reflect the reversed order of the words while preserving the characters within each word

5.

a. Write a C program which efficiently store and manage records of N students. The program allows the user to input the details of each student, including their name, along with other relevant information. Once all the records are entered, the program implements a sorting algorithm to arrange the student records in ascending order based on their names.

b. The C program is designed to store records of N students and sort them according to their marks. The program utilizes data structures and sorting algorithms to efficiently organize the student records based on their performance. It prompts the user to enter the number of students (N) and then dynamically allocates memory to store the required number of records. For each student, the program prompts the user to enter their name and marks. After storing all the records, it proceeds to sort them in ascending order based on the marks achieved by each student.

c. The C program uses a pointer to a structure to initialize the members within the structure. It also utilizes functions to print the student information. The program allows the user to input data for multiple students and stores the information in the structure using pointer notation. It then calls the appropriate functions to display the student details on the screen. By utilizing pointers to structures, the program optimizes memory usage and enables efficient manipulation of the student data.

6.

a. This C program utilizes pointers to check whether a given string is a palindrome or not. It prompts the user to enter a string and then uses pointer manipulation to compare characters from both ends of the string. By iterating through the string using pointers, the program checks if the characters at corresponding positions are the same or not. If all the characters match, the program concludes that the string is a palindrome. Conversely, if any pair of characters does not match, the program determines that the string is not a palindrome.

b. Write a C program allows the user to store n elements in an array and then utilizes a pointer to print the elements. The program prompts the user to enter the number of elements (n) they wish to store in the array. It dynamically allocates memory for the array based on the user's input. Next, the program asks the user to input the n elements one by one. After storing the elements in the array, it uses a pointer to iterate through the array and print each element. By leveraging pointer arithmetic, the program efficiently accesses the array elements and displays them to the user. This program provides a dynamic and pointer-based approach to store and print array elements in C.

c. Write a C program to utilize dynamic memory allocation to find the largest element in an array. It prompts the user to enter the number of elements they wish to store in the array. Using this input, the program dynamically allocates memory for the array.

d. Write a C program allows the user to replace a specific line with another text in a file. The program prompts the user to enter the name of the file and the line number they want to replace. It then asks the user to input the new text that will replace the specified line. This program defines a function encrypt File that takes the path to an input file, the path to the output file, and an encryption key as parameters. It reads the input file line by line and encrypts each character using the provided key. The encrypted characters are then written to the output file.

e. Write a C program to perform basic operations on linked list: Creation, insertion, deletion, and traverse in linked list.

Total Hours: 60 hrs.

Mode of Evaluation

CA1 25	CA2 25	ESE	Total
50		50	100

Course Code: IT102P	Course Name: Web Designing	L	T	P	C
		0	0	2	1

Pre-requisite: NA

Course Objectives:

1. Provide students with a good understanding of the basic concepts of web design, using HTML, CSS, and JavaScript.
2. Enable students to analyse web pages using various formatting techniques of CSS and HTML.
3. Enable students to process webpage data on client machines in integration with html using JavaScript.
4. Apply the techniques of CSS, HTML and JavaScript for designing competitive websites.

Course Outcome: After completion of the course, the student will be able to

1. Understand the concept of layout and structure of Hypertext markup language (HTML)
2. Apply the integration of Cascading style sheets (CSS) in HTML pages.
3. Apply the JavaScript concept to process and validate the data of a web page on client Machine.

4. Design the website with the application of HTML, CSS and JavaScript.
5. Demonstrate practical implementation of HTML, CSS, and JavaScript by developing real-time use case projects.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	-	-	1	-	-	-	3
CO2	3	2	2	2	2	-	-	1	-	-	-	3
CO3	3	2	2	2	2	-	-	1	-	-	-	3
CO4	3	3	3	3	3	-	-	1	-	-	-	3
CO5	3	2	3	3	3	-	-	1	-	-	-	3

Syllabus:

- **HTML:** Elements, attributes, heading, paragraph, styles, comments, links, images, favicon, tables, list, class, id, HTML forms, HTML media, navigation bar.
- **CSS**: Types of CSS, colors, background, margins, padding, height, width, text, font, icon, links, list, tables, display, z-index, float, overflow, CSS media queries, inline block, navigation bar, image gallery, forms, round corners
- **JavaScript** script, function, output, statement, variables, operators, datatypes, objects, events, string methods, Arrays, if else, switch, loop for, loop in, loop for, debugging, validation of forms.

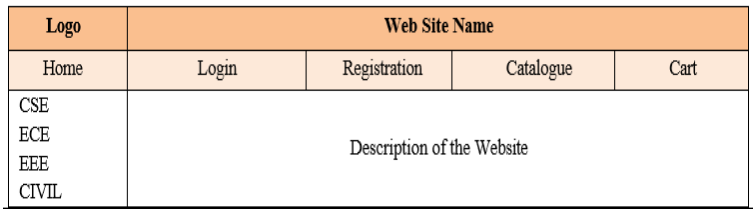
List of Practical's (Indicative & Not Limited To)

1. Design the following static web pages required for an online bookstore website.

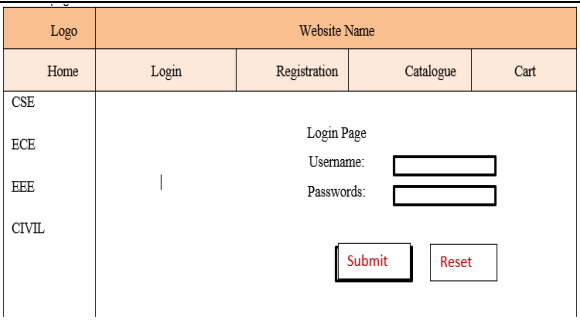
HOMEPAGE:

- The static home page must contain three **frames**.
- Top frame: Logo and the college name and links to Homepage, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

For example: When you click the link **"CSE"** the catalogue for **CSE** Books should be displayed in the Right frame. Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.



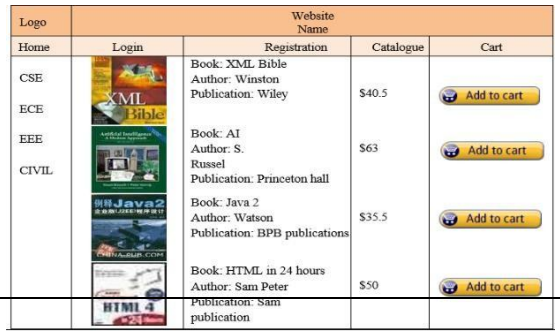
2. **LOGINPAGE:**
This page looks like below:



3. **CATOLOGUE PAGE:** The catalogue page should contain the details of all the books available in the website in a table. The details should contain the following:

a. Snapshot of Cover Page.
b. Author Name.
c. Publisher.
d. Price.

Add to cart button.



4. **CARTPAGE:** The cart page contains the details about the books which are added to the cart. The cart page should look like this:

Logo	Web Site Name				
Home	Login	Registration		Catalogue	Cart
CSE	Book name	Price	Quantity	Amount	
ECE	Java 2	$35.5	2	$70	
EEE	XML bible	$40.5	1	$40.5	
CIVIL	Total amount	- $130.5			

5. **REGISTRATION PAGE:** Create a "registration form" with the following fields
   a. Name (Text field)
   b. Password (password field)
   c. E-mail id(text field)
   d. Phone Number (text field)
   e. Sex (radio button)
   f. Date of birth (3 select boxes)
   g. Languages known (checkboxes–English, Telugu, Hindi, Tamil)

Address (text area)

6. **JS VALIDATION:** Write ***JavaScript* to validate** the following fields of the above registration page. Name (Name should contains alphabets and the length should not be less than 6 characters).
Password (Password should not be less than 6 characters length).

7. **JS VALIDATION:**
E-mail id (should not contain any invalid and must follow the standard pattern(name@domain.com) Phone Number (Phone number should contain 10 digits only).

8. **CSS:** Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following:
Use different font, styles: In the style definition you define how each selector should work(font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles. Set a background image for both the page and single elements on the page.

9. CSS:
Control the repetition of the image with the background-repeat property. Define styles for links as
   i. A:link
   ii. A:visited
   iii. A:active
   iv. A:hover

10. Consider a small topic of your choice on which you can develop static Webpages and try to implement all topics of html, CSS and Js within the topic. Choose any one topic.
   i. Your Own Portfolio
   ii. To-Do List
   iii. Survey Form
   iv. A Tribute Page
   v. A Questionnaire

Total Hours: 30 hrs.

Mode of Evaluation

CA1	CA2	ESE	Total	
25	25			
50		-	50	

Course Code: HS101P	Course Name: Communication Skills	L	T	P	C
		0	0	4	2
Pre-requisite: NA					
Course Objectives:					

1. Develop a foundational understanding of communication, including voice dynamics for effective speech delivery.
2. Enhance reading comprehension, note-making, and idea organization skills for academic and professional use.
3. Strengthen writing proficiency through vocabulary building and application of effective writing techniques.
4. Build essential listening and professional communication skills for employability.

Course Outcome: After completion of the course, the student will be able to

1. Understand the essentials of communicating in a professional setting.
2. Employ correct English usage and formal style of Listening - speaking.
3. Apply the usage of verbal and non-verbal cues in presentation and day-to-day communication.
4. Illustrate Communication skills that meet the nature and objectives of the workplace.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	2	3	-	1
CO2	-	-	-	-	-	-	-	-	2	3	-	1
CO3	-	-	-	-	-	-	-	-	2	3	-	1
CO4	-	-	-	-	-	-	-	-	2	3	-	1

Unit-1	**Echoes of Understanding** *Listening, Self-Introduction, Reading Skills and Vocabulary Enhancement*	**15 hours**

Listening Comprehension using videos from software. Ice Breaking Session: Assessment of communication skills through brief self-introductions stage time (1-2 min per student); Reading Comprehension Exercise – Analytical Understanding of Informational Text using books/scientific text.Self-Analysis using SWOT/SWOC (Identification of Individual Strength, Weakness, Opportunity and Threats/Challenges);**Read Aloud Activity and Assessment** using newspapers like ***The Times of India***, ***The Hindu***, **and** ***The Indian Express u****sing* Reading methods -Skimming, Scanning, Churning and Assimilation.
Vocabulary Enrichment using Gamified methods; Doubt clearing session, Vocabulary quiz using Cohort.

Unit 2	**The Art of Expression** *Writing, Grammar concept building and Speaking Skills*	**15 hours**

Writing practices: Paragraph development in 100-120 words, Explaining complex concepts simply; **Grammar concept relevant to scientific communication:** Identifying and correcting grammar errors using worksheet or quiz related to: Parts of Speech, Tenses, voice, Preposition, Articles & conjunctions; Transforming sentences simple to complex, Extempore: Interactive and Communicative Practical with emphasis on Oral Presentation, based on International Phonetic Alphabets (I.P.A.)Written Professional Communication: Email, Formal Letters, and Applications used in professional settings
Speaking: Team presentation enhancing collaborative presentation skills; Introducing person, places and events.; Impromptu Speaking; "Just a Minute" speaking game on general awareness/social/scientific topics.

Unit 3	**Beyond the Lines** *Formal Speaking and Critical Thinking*	**15 hours**

Team presentations for idea pitching using visual aids and supporting materials; Practice of kinesics, paralinguistics,
Peer feedback, Strategies for answering questions effectively
Voice modulation through Role Play Presentation with Stress and Intonation activities based on real-time scenarios;
Development of persuasive communication skills through structured debates.
Script/Essay writing on PESTLE(Political, Economic, Scientific, Technical, Literary and Engineering) range of topics.

Unit 4	**Express & Engage** – *Practical Communication Approach*	**15 hours**

Official/Public Speaking based on suitable Rhythmic Patterns, Turn-a-coat.
Group Discussion: Practical based on Accurate and Current Grammatical Patterns

	Total Hours	**60 hours**

Mode of Evaluation

MSE1	MSE2	CA1	CA2	ESE	Total
40	-	-	10		
50				50	100

Course Code: HS103P	Course Name: Basic Proficiency in Japanese	L	T	P	C
		0	0	4	2

Pre-requisite: NA

Course Objectives:

1. To Develop basic listening, speaking, reading and writing proficiency in the target language, enabling global communication skills.
2. To Foster an understanding of intercultural communication, particularly between Indian and target-language-speaking cultures.
3. Introduce students to the global significance of the target language and appreciate its culture & ethics in international contexts.

Course Outcome: After completion of the course, the student will be able to

1. To Understand the basic parts of speech of the language, put up basic questions and be able to introduce themselves in respective language and understand the Particle
2. Understand how language and culture interact in global context and impact intercultural communication.
3. Apply their learning in basic conversations, sentence building and understand the social etiquette of professional world
4. Utilize the skills of listening, speaking and non-verbal communication in the target language.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	1	3	-	2
CO2	-	-	-	-	-	-	-	-	2	3	-	2
CO3	-	-	-	-	-	-	-	-	3	3	-	2
CO4	-	-	-	-	-	-	-	-	3	3	-	2

Unit 1	Introduction to Basic Components of Japanese Language	15 hours

Grammar: Affirmative and Negative Declaration, Interrogation, Past and Non Past Simple Tense, Time, Direction and Demonstration, Basic Knowledge of Particles
Particles: は、か、も、の、に、と、ね、から～まで
Writing: Hiragana
Miscellaneous: Self Introduction, Greeting and Body Language, Basic Etiquettes

Unit 2	Excelling in Sentence Framing	15 hours

Grammar: Verbs, Adjectives, Object and Further Knowledge of Particles
Particles: へ、よ、を、で、に、が
Writing: Katakana
Miscellaneous: Art and Culture of Japan

Unit 3	Increasing Expressivity	15 hours

Grammar: Existence/Presence, Preference, Degree and Capability, Possession, Numbers and Quantifiers, Further Knowledge on Past tense, Categories
Particles: から、や
Writing: Kanji
Miscellaneous: Business and Professional Etiquettes

Unit 4	Expanding the Range of Communication	15 hours

Grammar: Desire, Movement, Te form and it's uses
Particles: に
Writing: Kanji
Miscellaneous: Holding Conversations in a Natural Manner

	Total Hours	60 hours

Mode of Evaluation

MSE1	MSE2	CA1	CA2	ESE	Total
-	40	5	5		
50				50	100

Course Code: HS104P	Course Name: Basic Proficiency in German	L	T	P	C
		0	0	4	2

Pre-requisite: NA

Course Objectives:

1. To develop basic listening, speaking, reading and writing proficiency in the target language, enabling global communication skills.
2. To foster an understanding of intercultural communication, particularly between Indian and target-language-speaking cultures.
3. Introduce students to the global significance of the target language and appreciate its culture and ethics in international

contexts.

Course Outcome: After completion of the course, the student will be able to

1. To Understand the basic parts of speech of the language, put up basic questions and be able to introduce themselves in respective language and understand the syllables and numbers.
2. Understand how language and culture interact in global context and impact intercultural communication.
3. Apply their learning in basic conversations, sentence building and understand the social etiquette of professional world
4. Utilize the skills of listening, speaking and non-verbal communication in the target language.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	1	3	-	2
CO2	-	-	-	-	-	-	-	-	2	3	-	2
CO3	-	-	-	-	-	-	-	-	3	3	-	2
CO4	-	-	-	-	-	-	-	-	3	3	-	2

Unit 1	**Introduction to Basic Components of German Language**	**15 hours**

Die Begrüßungen (Basic Greetings), Sich Vorstellen (Self-Introduction), Das Alphabet und Die Zahlen (Alphabet and Number System)
Grammar- Die Regelmäßige und Unregelmäßige Verben- Introduction to Basic Verbs
Grammar- Die Frage Bilden und Imperativ- Question Making and understand day to day life instruction

Unit 2	**Navigating Everyday Situation with Basic Vocabulary**	**15 hours**

Grammar - Das Konzept von Artikeln, Adjektive und Die Negation - Introduction to New Vocabulary - Topics from Everyday walks of Life and Negations
Grammar - Die Uhrzeit und Das Datum - Concept of Date and Time
Grammar - Die Modal Verben und Die Trennbare Verben – The Modal Verbs and Separable Verbs

Unit 3	**Communication in German**	**15 hours**

Grammar – Die Possessiv Pronomen - Introduction to Possessive Pronouns
Grammar - Introduction of basic sentence Making: Nomminativ, Akkusativ, dativ
Grammar- , Wechsel Präpositionen (Changeable Prepositions)

Unit 4	**Understanding Indian and German Cultures**	**15 hours**

Introduction to Vocabulary: Festival, Celebrations
Grammar: Partizip Perfekt (Present Perfect Tense)
Professional and non-professional communication: E-mail Writing and Form Filling Exercises

Total Hours	**60 hours**

Mode of Evaluation

MSE1	MSE2	CA1	CA2	ESE	Total
-	40	5	5		
50				50	100

Course Code: HS105P	Course Name: Basic Proficiency in French	L	T	P	C
		0	0	4	2

Pre-requisite: NA

Course Objectives:

1. To develop basic listening, speaking, reading and writing proficiency in the target language, enabling global communication skills.
2. To foster an understanding of intercultural communication, particularly between Indian and target language speaking cultures.
3. Introduce students to the global significance to the target language and appreciate its culture & ethics in international contexts.

Course Outcome: After completion of the course, the student will be able to

1. Introduce themselves in the respective language and understand the syllables and numbers
2. Apply their learning in basic conversation and understand the social etiquette of professional world
3. Understand how language and culture interact in global context and impact intercultural communication
4. Utilize the skills of listening, speaking and non verbal communication in the target language.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	2	2	-	2
CO2	-	-	-	-	-	-	-	-	2	3	-	2
CO3	-	-	-	-	-	-	-	-	1	2	-	2
CO4	-	-	-	-	-	-	-	-	3	2	-	3

Unit 1	Basic Components of French Language	15 hours

Se saluer (Express and Understand basic greetings)
Les pronoms sujets (Subject pronouns)
Le présent (régulier/irrégulier)
Les phrases négatives (negative sentences)
Les articles (définis/indéfinis)
Les nationalités/métiers (nationalities/professions)
Demander les questions de la nationalité/du métier (Ask the questions of nationality and profession)
Orally present oneself (Using simple adjectives)

Unit 2	Expressing Needs and Asking Questions	15 hours

Les adjectifs possessifs (The possessive adjectives)
Les prépositions (The prepositions)
Les pays et les langues (The countries and languages)
Les articles contractés (The contracted articles)
Les questions fermées (The closed questions)
Les adjectifs interrogatifs (The interrogative adjectives)
Cultural Focus: French social etiquettes, mealtime behaviour

Unit 3	Basic Communication and Social Etiquettes	15 hours

Le Futur Proche (Near future tense)
Le présent progressif (Present continuous)
Le passé récent (recent past tense)
Les verbes pronominaux (The pronominal verbs)
L'heure (The time)
Cultural Focus: Formal and Informal communication in French

Unit 4	Respecting French and Indian Cultures in Global Context	15 hours

La Carte Postale (Post Card)
La fiche d'inscription (Information Form)
Les loisirs (The hobbies)
Parler en classe de votre vie quotidienne en parlant de vos loisirs (Speak about your daily routine while talking about your hobbies)

	Total Hours	60 hours

Mode of Evaluation

MSE1	MSE2	CA1	CA2	ESE	Total
-	40	5	5		
50				50	100

Course Code: HS106P	Course Name: Basic Proficiency in Spanish	L	T	P	C
		0	0	4	2

Pre-requisite: NA

Course Objectives:

1. To develop basic listening, speaking, reading and writing proficiency in the target language, enabling global communication skills.
2. To foster an understanding of intercultural communication, particularly between Indian and target language speaking cultures.
3. Introduce students to the global significance to the target language and appreciate its culture & ethics in international contexts.

Course Outcome: After completion of the course, the student will be able to

1. Introduce themselves in the respective language and understand the syllables and numbers
2. Apply their learning in basic conversation and understand the social etiquette of professional world
3. Understand how language and culture interact in global context and impact intercultural communication
4. Utilize the skills of listening, speaking and non-verbal communication in the target language.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	1	3	-	2
CO2	-	-	-	-	-	-	-	-	1	3	-	2
CO3	-	-	-	-	-	-	-	-	3	3	-	2
CO4	-	-	-	-	-	-	-	-	2	3	-	2

Unit 1	**Hi! What is your name? (¡Hola! ¿Cómo te llamas?) Where are you from? (¿De dónde eres?)**	**15 hours**

Grammar: Verb ser, subject pronouns, basic question forms, Verb estar, difference between ser and estar, articles
Vocab: Greetings, nationalities, countries, professions, numbers 0–50
Functions: Introducing yourself and others. Talking about origin, profession, phone number, email
Culture: Formal vs. informal greetings in Spain/Latin America. Naming conventions in Spanish-speaking countries.

Unit 2	**My Family and I (Mi familia y yo) My Daily Routine (La rutina diaria)**	**15 hours**

Grammar: Possessive adjectives, singular/plural nouns, tener, reflexive verbs, present tense regular verbs.
Vocab: Family, age, descriptions (basic adjectives), daily activities, time expressions
Functions: Describing family and physical appearance, talking about routines and habits
Culture: Family structure in Spanish-speaking cultures

Unit 3	**In the City (En la ciudad) In the Restaurant (En el restaurant)**	**15 hours**

Grammar: Hay vs. está, prepositions of place, verb querer, gustar, using me/te/le gusta(n)
Vocab: Places in town, directions, Food, drink, menus
Functions: Asking for and giving directions, ordering food, expressing likes/dislikes
Culture: Typical Spanish towns and their layouts, Tapas culture in Spain

Unit 4	**Understanding Spanish Culture (Comprendiendo la cultura Española)**	**15 hours**

Grammar: Numbers 50–100, demonstratives, gender/number, Irregular verbs in present tense, ir + a + infinitive, verb haber (hay), describing objects, prepositions
Vocab: Clothes, shopping phrases, colors, hobbies, leisure activities, Rooms, furniture, household items
Functions: Buying things, talking about prices, talking about hobbies and future plans, describing your home
Culture: Markets vs. Malls in Hispanic countries, Popular sports and free time activities in Spain

Total Hours	**60 hours**

Mode of Evaluation

MSE1	MSE2	CA1	CA2	ESE	Total
-	40	5	5		
50				50	100

Course Code: AI102P	Course Name: Python for Engineers	L	T	P	C
		0	0	4	2

Pre-requisite: Basic programming knowledge, Fundamental concepts of Mathematics.

Course Objectives:

Learn Python basics, master data manipulation, utilize python libraries, and gain hands-on experience in programming, data analysis, and visualization.

Course Outcome: After completion of the course, the student will be able to

1. Use Python variables, operators, expressions, blocks, and numeric types to solve computational problems.
2. Apply Python conditional statements, loops, and loop control.
3. Use Python complex data types (strings, lists, tuples, dictionaries) and functions for efficient data manipulation and problem-solving.
4. Apply Python file operations for reading, writing, manipulating files, and processing structured data efficiently.
5. Develop simple programs utilizing built-in functions of Python packages like Matplotlib, NumPy, and Pandas.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	3	-	-	-	-	-	-	3
CO2	3	3	2	-	3	-	-	-	2	2	-	3
CO3	3	3	3	2	3	-	-	-	2	2	-	3
CO4	3	3	2	2	3	-	-	2	2	2	-	3
CO5	3	3	2	2	3	-	-	2	2	3	-	3

Unit 1	**Introduction to Python**	**12 hours**
Python variables, Python basic Operators, Type Conversion, Expressions, Understanding python blocks, Python Data Types, Declaring and using Numeric data types: int, float etc.		
Unit 2	**Python Program Flow Control Conditional Blocks**	**12 hours**
If, else and else if, simple for loops in python, For loop using ranges, Use of while loops in python, Loop manipulation using pass, continue, break and else, Programming using Python conditional and loop blocks.		
Unit 3	**Python Complex Data Types**	**12 hours**
Using string data type and string operations, Defining list and list slicing, Use of Tuple data type, String, List and Dictionary, Manipulations Building blocks of python programs, String manipulation methods, List manipulation, Python Functions, Organizing python codes using functions, Sort the sentence in alphabetical order/ remove punctuations from the given string.		
Unit 4	**Python File Operations**	**12 hours**
Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek Programming, using file operations.		
Unit 5	**Python Packages**	**12 hours**
Simple programs using the built-in functions of packages matplotlib, simple programs using the built-in functions of packages numpy, pandas etc.		
		Total Hours 60 hours

Mode of Evaluation

MSE	CA1	CA2	ESE	Total
-	25	25		
50			50	100

Course Code: IT104P	Course Name: Innovation and Entrepreneurship	L	T	P	C
		0	0	2	1

Pre-requisite: NA

Course Objectives:

The course will provide hands-on learning experiences, problem-solving skills, product development knowledge, and interpersonal skills necessary for future entrepreneurs. By the end of the course, students will be equipped to start working on their start-up ideas or develop entrepreneurial competencies that will be beneficial for careers in both industry and business.

Course Outcome: After completion of the course, the student will be able to

1. Understand different types of innovation, innovative thinking and their role in solution of real-world challenges.
2. Understand creative problem-solving skills and use the Business Model Canvas to shape viable business ideas.
3. Analyze market research, identify target customers, and validate business ideas using data-driven insights.
4. Understand pitch business ideas, integrate expert feedback, and pursue funding or mentorship opportunities.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	2	-	2	-	2	2
CO2	-	-	-	-	-	2	2	-	2	-	2	2

CO3	-	-	-	-	-	2	2	-	2	-	2	2
CO4	-	-	-	-	-	2	2	-	2	-	2	2

Unit 1	**Innovation & Creativity**	**07 hours**

- Resource Person: Technical Expert/ Innovator/Entrepreneur
- Content Overview: Introduction to Innovation, the importance of Innovation in life, Type of Innovation, Stages of Innovation, success stories, and opportunities available to students.

Unit 2	**Idea/ Innovation Generation, Commercialization & Business Model Canvas Workshop**	**07 hours**

- Resource Person: Innovation Coaches/Startup Mentors
- Content Overview: Techniques for brainstorming, creativity exercises, introduction to the Business Model Canvas, and developing business concepts.

Unit 3	**Market Research and Validation Workshop**	**08 hours**

- Resource Person: Market Research Analysts/Marketing Professors
- Content Overview: Conducting market research, understanding target customers, market segmentation, and validating business ideas.

Unit 4	**Prototype Development & Pitching Workshop**	**08 hours**

- Resource Person: Product Developers/Venture Capitalists
- Content Overview: Creating a minimum viable product (MVP), hands-on prototyping, crafting, and delivering a compelling pitch.

Total Hours: 30 hours

For reference: To ensure maximum engagement and learning, the course will be delivered through:

- Ignite (Master Class)
- Startup Interactions: lectures from successful entrepreneurs, startup founders, and investors
- IPR workshop
- Team Formation (Interdisciplinary minimum 3 dept)
- Mentorship & Guidance: Faculty mentors
- Hackathons: Prototyping, branding, and pitching

Mode of Evaluation

MSE	CA1	CA2	ESE	Total
-	25	25		
50			-	50

Course Code: EC202P	**Course Name: Intelligent Health Care Systems Lab**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Pre-requisite: NA

Course Objective:

1. Explore Fundamentals of Health Care and the Role of Intelligent Systems in Health Care System.
2. Realize Health Care Technologies with Emerging Trends and Innovations.

Course Outcome: After completion of the course, the student will be able to:

1. Apply the Fundamentals of Health Care Systems
2. Explore the Role of Intelligent Systems in Health Care.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	1	-	1	-	-	-	1
CO2	3	3	2	2	1	1	-	1	-	-	-	1

List Of Practical's (Indicative & Not Limited To)

1. Design and Implement Automated Vital Signs Monitoring System.
2. Design and Implement Smart Alert System for Health Parameters.
3. Design and Implement Interactive Smart Tongue.
4. Design and Implement i-ball synchronized with eye rotation.
5. Design and Implement Machine Learning for Predictive Healthcare Analytics.
6. Design and Implement Wearable Heart Rate and SPO2 Monitor.

7. Design and Implement Portable ECG Monitoring System.
8. Design and Implement Smart Fall Detection System.
9. Design and Implement Non-invasive Glucose Monitor.
10. Design and Implement Smart Pill Dispenser.
11. Design and Implement Body Temperature Monitoring Patch.
12. Design and Implement Wearable EMG Muscle Activity Monitor.
13. Design and Implement Continuous Blood Pressure Monitor.
14. Design and Implement Wireless Health Monitoring System.

Total Hours: 30 hrs.

Mode of Evaluation

MSE	CA1	CA2	ESE	Total
-	12	13		
25			25	50

Course Code: EE102P	Course Name: Explorations in Electrical Engineering Lab	L	T	P	C
		0	0	2	1

Pre-requisite: NA

Course Objectives:

1. Aim to Implement different circuits and verify circuit concepts for DC and AC circuits.
2. Aim to learn the basics of electrical machines.

Course Outcome: After completion of the course, the student will be able to

1. Understand the concepts of electric circuits with DC supply using mesh-nodal analysis and Network Theorems.
2. Apply the concepts of electrical circuits with AC supply in single and three phase system
3. Analyze the equivalent circuit and performance of single-phase AC transformer
4. Illustrate the working principle of induction motors, synchronous machines and DC machines.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	-	-	-	-	-	-	-	2
CO2	3	2	2	2	-	-	-	-	-	-	-	2
CO3	3	3	2	2	-	-	-	-	-	-	-	3
CO4	3	3	2	2	-	-	-	-	-	-	-	3

List of Practical's (Indicative & Not Limited To)

1. Verification of Kirchhoff's Laws: Conduct an in-depth analysis of Kirchhoff's Current and Voltage Laws through practical circuit experiments, validating their applications in complex electrical networks and understanding their role in circuit analysis and design.
2. Application of Superposition Theorem in Linear Circuits: Investigate the Superposition Theorem by analysing linear electrical circuits with multiple sources. Assess the theorem's effectiveness in simplifying circuit analysis and its implications for circuit design and problem-solving.
3. Exploring Thevenin's Theorem in Circuit Analysis: Study and apply Thevenin's Theorem to convert complex circuits into simpler equivalent circuits. Examine its practical use in circuit design and troubleshooting, emphasizing real-world applications and benefits.
4. Parameter Analysis of Single-Phase AC Series RLC Circuit: Analyze and determine the key parameters (resistance, inductance, and capacitance) of a single-phase AC series RLC circuit. Explore the impact of these parameters on circuit behaviour, including impedance, phase angle, and resonance.
5. Measurement and Analysis of Power Consumption in Fluorescent Lamps: Set up and measure the power consumption of a fluorescent lamp (tube light), including an analysis of efficiency and power factors. Understand the implications for energy management and cost-efficiency in lighting systems.
6. Power Measurement and Power Factor Improvement in Single-Phase AC Circuits: Measure the power and power factor of a single-phase AC series inductive circuit. Investigate methods to improve power factor using capacitors and evaluate the impact on circuit performance and efficiency.

7. Efficiency Testing of a Single-Phase Transformer: Perform a load test on a single-phase transformer to determine its efficiency. Analyze performance under varying load conditions and understand the practical considerations for transformer operation and maintenance.
8. Speed Control Techniques for DC Shunt Motors: Explore speed control methods for DC shunt motors through armature and field control techniques. Assess the effectiveness and applications of these methods in industrial and commercial motor-driven systems.
9. Starting and Reversal of Three-Phase Induction Motors with speed monitoring: Study the operation and speed reversal of three-phase induction motors. Measure and record motor speed in both forward and reverse directions, and analyze the implications for motor control and application.
10. Calibration Techniques for Single-Phase Induction-Type Energy Meters: Perform calibration of single-phase induction-type energy meters to ensure accurate measurement of electrical energy. Explore calibration methods and their significance for metering accuracy and compliance.
11. Cut-Out Sections Demonstration of Electrical Machines: Examine and discuss cut-out sections of various electrical machines, including DC machines, three-phase induction machines, single-phase induction machines, and synchronous machines. Understand their construction, operation, and design principles through hands-on exploration.
12. Overview of Electric Vehicle Components: Demonstrate and analyze the various sections of electric vehicles. Explore the design, functionality, and integration of key components, including electric motors, battery systems, and control electronics, to understand their role in modern transportation.

Total Hours: 30 hrs.

Mode of Evaluation:

MSE	CA1	CA2	ESE	Total
-	12	13		
25			25	50

Course Code: EL105P	Course Name: Computer Aided Electrical Design	L	T	P	C
		0	0	2	1

Pre-requisite: Basic Computer Skills, Experience with drawing tools (lines, circles, layers, blocks), Knowledge of object properties, dimensions, and annotations, Fundamentals of Electrical Engineering, Basic understanding of electrical components (relays, contactors, fuses, switches, etc.), Knowledge of circuit diagrams (schematics, panel layouts, wiring diagrams)

Course Objectives:

1. Introduce basic tools and interface of Electrical Design.
2. Develop skills to create and edit electrical schematics and panel layouts.
3. Apply electrical concepts in designing simple control circuits.
4. Familiarize with industry standards and documentation practices.

Course Outcome: After completion of the course, the student will be able to

1. Navigate and use Electrical design tools for basic circuit design using AutoCAD Electrical.
2. Create and interpret 2D electrical schematics and wiring diagrams using AutoCAD Electrical.
3. Design simple control circuits using standard symbols and tools using AutoCAD Electrical.
4. Generate project reports, bill of materials, and follow drafting standards using AutoCAD Electrical.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	-	2	-	-	-	1	1	-	-
CO2	3	1	2	-	2	-	-	-	1	1	-	-
CO3	3	1	2	-	2	-	-	-	1	1	-	-
CO4	3	1	1	-	2	-	-	-	1	1	-	-

List Of Practical's (Indicative & Not Limited To)

1. Introduction to AutoCAD Electrical Interface and Project Setup
2. Creating Basic Electrical Drawing Using Lines, Arcs, and Text
3. Working with Layers, Title Blocks, and Drawing Templates

4. Inserting and Editing Electrical Symbols from Symbol Libraries
5. Creating and Annotating Simple Single-Line Diagrams
6. Designing Power Circuit Diagrams Using Standard Components
7. Developing Control Circuit Diagrams (Start/Stop Motor Control)
8. Creating Ladder Diagrams with Rungs and Components
9. Generating and Managing Bill of Materials (BOM)
10. Creating Panel Layout Diagrams with Footprints and Wire Tags
11. Wire Numbering and Cross-Referencing Between Schematics
12. Creating Custom Symbols and Adding Them to the Library
13. Using PLC Modules in Circuit Design and Addressing I/O
14. Error Checking and Using Audit Tools in AutoCAD Electrical
15. Final Project: Complete Electrical Project Design with Schematics and Panel Layout.

Total Hours: 30 hrs.

Mode of Evaluation

MSE	CA1	CA2	ESE	Total
-	12	13		
25			25	50

Course Code: EC208P	Course Name: Digital Logic Design using HDL Lab	L	T	P	C
		0	0	2	1

Pre-requisite: Basic Computer Skills, Experience with drawing tools (lines, circles, layers, blocks), Knowledge of object properties, dimensions, and annotations, Fundamentals of Electrical Engineering, Basic understanding of electrical components (relays, contactors, fuses, switches, etc.), Knowledge of circuit diagrams (schematics, panel layouts, wiring diagrams)

Course Objectives:

1. To develop proficiency in using Hardware Description Languages (HDLs) such as VHDL / Verilog for designing and modelling digital systems using behavioural, dataflow, and structural approaches.
2. To understand and implement fundamental combinational and sequential digital circuits including multiplexers, demultiplexers, flip-flops, counters, shift registers, and finite state machines using HDL.

Course Outcome: After completion of the course, the student will be able to

1. Apply the concept of HDL for implementing Combinational circuits such as logic gates, multiplexers, and demultiplexers.
2. Apply the concept of HDL for implementing Sequential circuits like flip-flops, counters, and shift registers.
3. Apply HDL to develop and test finite state machines and system-level components such as serial adders, ALUs, traffic light controllers etc.

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3	2	3	-	-	-	-	-	-	2
CO2	2	3	3	2	3	-	-	-	-	-	-	2
CO3	2	3	3	3	3	-	-	-	-	-	-	2

List Of Practical's (Indicative & Not Limited To)

1. Basic Logic Gates using HDL:
2. Write, simulate, and verify AND, OR, NOT, NAND, NOR gates using both behavioural and structural modelling styles.
3. Design of adder and subtractor using HDL.
4. Design of a 4:1 Multiplexer using HDL.
5. Design of a 1:4 Demultiplexer using HDL.
6. Design and Simulation of Flip-Flops (D, T, JK) using HDL.
7. Design of 4-bit Synchronous and Asynchronous Counters using HDL
8. Design of shift register using HDL.
9. Write HDL code for Mealy & Moore‟s type FSM‟s

10. Write HDL code for serial adders
11. Write HDL code for traffic light controller.
12. Write HDL code for vending machine
13. Design of a 4-bit ALU using HDL.

Total Hours: 30 hrs.

Mode of Evaluation

MSE	CA1	CA2	ESE	Total
-	12	13		
25			25	50

Course Code: HS164P	Course Name: Indian Knowledge System	L	T	P	C
		0	0	2	NC

Indian Knowledge System: Students need to choose any one from the Courses offered

1. Case Study of Indian water storage system
2. Case study of Indian urban planning (Indus valley civilization)
3. Learning of Geeta for Engineers
4. Vasudhaiva kutumbakam: Indian model of multiculturalism
5. Impact of Satvik Food on the Gut-Microbiome Diversity
6. Review Socialism in Light of Ramayana (Critical Thinking)
7. The Relevance and Applicability of Chanakya's (Kautilya) Arthaśāstra for Solving Current Societal Problems
8. Lessons of Leadership from Mahabharat
9. Study of Ancient Indians Technology for Extraction, Purification, and Alloying of Metals such as Gold, Silver, Copper, and Iron
10. Study of Herbs used in Kitchen for Healthy Life(Haldi, Garlic etc.)
11. Study of Indian Astrology System
12. Study Significance of the Asanas , Pranayams and Surya Namaskar
13. Study of Vastu Shastra
14. Study of Ayurveda
15. Orientation of Temples of South India and their Astronomical Associations
16. Corporate Social Responsibility: A Philosophical Social Engineering Approach from an Ancient Indian Perspectives

Total Hours: 30 hrs.

Mode of Evaluation

MSE	CA1	CA2	ESE	Total
-	25	25		
50			-	NC

Course Code: NA	Course Name: Self-Growth	L	T	P	C
		0	0	2	NC

Self-Growth: Students need to choose any one from the Courses offered

1. Dual Instrument Mastery: Piano & Guitar Basics
2. Global Beats: A Course in Drums & Tabla
3. Foundation of Classical Vocal Music
4. Foundation of Western Vocal Music
5. Rhythmic Expression: A Course in Rap & Beatboxing
6. Acting Techniques: Stage and Screen
7. Writing for Stage and Screen: Script Writing
8. Traditional Dance Form: Classical & Folk
9. Fusion Dance: Bollywood and Western Style
10. The Art of Photography and Digital Editing

11. Foundation of Painting 12. Shooting Game Essentials: From Beginner to Pro 13. Table Tennis Mastery: Techniques and Tactics 14. Mastering Billiards: Techniques & Strategy 15. Fundamentals of Badminton 16. Lawn Tennis Mastery: Techniques, Tactics, and Strategy 17. Cricket Mastery: Techniques and Strategies 18. Basketball Fundamentals: Dribbling, Shooting, and Defense 19. Kabaddi Fundamentals: From Attack to Defense 20. Volleyball Mastery: Techniques and Tactics 21. Football Mastery: Techniques and Tactics 22. Track & Field Fundamentals: Running, Jumping, Throwing 23. Karate Fundamentals: From Stance to Strike
Total Hours: 30 hrs.

Distribution of departments in Groups for Autonomous Session 2025-2026

Group A	No. of sections	Group B	No. of sections
CSE	5	CSE(AIML)	5
CS	4	CSE(AI)	4
ECE	3	IT	3
CSIT	3	CSE-CS	1
ECE-VLSI	1	CSE-DS	1
AM&IA		ELCE	1
		ME	1
		EEE	1
Total	**16**	**Total**	**17**

Group-A (CSE/CS/ECE/CSIT/ECE-VLSI/AM&IA)			
Semester-I			
S. No.	**Name of Theory/Blended Courses**	**S. No.**	**Name of Practical Courses**
1	Calculus for Engineers	1	Programming for Problem Solving Lab
2	Environmental Chemistry	2	Computer Organization & Logic Design Lab (CSE/CS/CSIT/ECE/ECE-VLSI)
3	Programming for Problem Solving	3	Web Designing (CSE/CS/CSIT)
4	Computer Organization & Logic Design (CSE/CS/CSIT/ECE/ECE-VLSI)	4	Intelligent Health Care Systems Lab (ECE)
5	Fundamentals of Mechatronics and Industrial Automation (AM&IA)	5	Explorations in Electrical Engineering Lab (AM&IA)
6	Explorations in Electrical Engineering (AM&IA/ECE-VLSI)	6	Foreign Language
7	Design Thinking	7	Indian Knowledge System (CSE/CS/ECE/ECE-VLSI/AM&IA)
8	Design & Realization	8	Self-Growth (CSIT)
9	Intelligent Health Care Systems (ECE)		
Semester-II			
S. No.	**Name of Theory/Blended Courses**	**S. No.**	**Name of Practical Courses**
1	Linear Algebra for Engineers (CSE/CS/CSIT/ECE/ECE-VLSI)	1	Semiconductor Physics and Devices Lab
2	Differential Equation & Complex Integration (AM&IA)	2	Digital Logic Design using HDL Lab (ECE-VLSI)
3	Semiconductor Physics and Devices	3	Python for Engineers
4	Data Structure	4	Communication Skills
5	Discrete Structures & Theory of Logic (CSE/CS/CSIT)	5	Indian Knowledge System (CSIT)
6	Emerging Technologies for Engineers (AM&IA)	6	Self-Growth (CSE/CS/ECE/ECE-VLSI/AM&IA)
7	Digital Logic Design using HDL VLSI		
8	Explorations in Electrical Engineering ECE		
9	Introduction to IoT (CSE/CS/CSIT/ECE/AM&IA)		
10	Basic Electronics Engineering (ECE-VLSI)		

Group-B (CSE(AI)/CSE(AIML)/IT/CSE-CS/CSE-DS/ME/EEE/ELCE)			
Semester-I			
S. No.	**Name of Theory/Blended Courses**	**S. No.**	**Name of Practical Courses**
1	Calculus for Engineers	1	Semiconductor Physics and Devices Lab
2	Semiconductor Physics and Devices	2	Programming for Problem Solving Lab
3	Programming for Problem Solving	3	Explorations in Electrical Engineering Lab (ME/EEE/ELCE)
4	Discrete Structures & Theory of Logic (IT/CSE-AI/CSE-AIML/CSE-CS/CSE-DS)	4	Web Designing (CSE-CS/CSE-DS/CSE-AI/CSE-AIML/IT)
5	Explorations in Electrical Engineering (ME/EEE/ELCE)	5	Communication Skills
6	Design Thinking	6	Indian Knowledge System (CSE-DS/ME/EN)
7	Introduction to IoT	7	Self-Growth (CSE-AI/CSE-AIML/IT/CSE-CS/ELCE)
Semester-II			
S. No.	**Name of Theory/Blended Courses**	**S. No.**	**Name of Practical Courses**
1	Linear Algebra for Engineers (CSE-AI/CSE-AIML/IT/CSE-CS/CSE-DS/EEE/ELCE)	1	Computer Organization & Logic Design Lab (CSE-AI/CSE-AIML/IT/CSE-CS/CSE-DS/ELCE)
2	Differential Equation & Complex Integration (ME)	2	Python for Engineers
3	Environmental Chemistry (CSE-AI/CSE-AIML/IT/CSE-CS/ME/EEE/ELCE)	3	Foreign Language
4	Introduction to Data Science (CSE-DS)	4	Indian Knowledge System (CSE-AI/CSE-AIML/IT/CSE-CS/ELCE)
5	Data Structure	5	Self-Growth (CSE-DS/ME/EN)
6	Computer Organization & Logic Design (CSE-AI/CSE-AIML/IT/CSE-CS/CSE-DS/ELCE)		
7	Emerging Technologies for Engineers (ME/EEE)		
8	Design & Realization (IT/CSE-DS/ME/EEE/ELCE)		
9	Introduction to AI (CSE-AI/CSE-AIML)		
10	Introduction to Cyber Security (CSE-CS)		