FIRST YEAR CURRICULUM AND SYLLABUS
(REGULATIONS 2023)

FOR

UNDER GRADUATE PROGRAMMES

CHOICE BASED CREDIT SYSTEM

(Applicable to the students admitted from the Academic Year 2024-25 onwards)

B.E. – Automobile Engineering
B.E. – Biomedical Engineering
B.E. – Civil Engineering
B.E. – Computer Science and Engineering
B.E. – Computer Science and Engineering (AI & ML)
B.E. – Computer Science and Engineering (Cyber security)
B.E. – Computer Science and Design
B.E. – Electronics and Communication Engineering
B.E. – Electrical and Electronics Engineering
B.E. – Mechanical Engineering
B.E. – Robotics and Automation
B.Tech. – Artificial Intelligence and Data Science
B.Tech – BioTechnology
B.Tech – Computer Science and Business Systems
B.Tech. – Information Technology

EASWARI ENGINEERING COLLEGE
(AUTONOMOUS INSTITUTION)
Bharathi Salai, Ramapuram, Chennai – 600 089

(Version 1)

Approved in Academic Council Meeting Held on xx-xx-2024

FIRST YEAR CURRICULUM AND SYLLABUS
(REGULATIONS 2023)

FOR

UNDER GRADUATE PROGRAMMES

CHOICE BASED CREDIT SYSTEM

(Applicable to the students admitted from the Academic Year 2023-24 onwards)

B.E. – Automobile Engineering
B.E. – Biomedical Engineering
B.E. – Civil Engineering
B.E. – Computer Science and Engineering
B.E. – Computer Science and Engineering (AI & ML)
B.E. – Computer Science and Engineering (Cyber security)
B.E. – Computer Science and Design
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EASWARI ENGINEERING COLLEGE
(AUTONOMOUS INSTITUTION)
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(Version 1)

CONTENTS

I Year - Automobile Engineering

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES101T	Engineering Graphics	ES	2	-	3	1	4	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 /60
PRACTICALS									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
9	231GEH111L	Induction Training [&]	MC	-	-	2	-	0	-
TOTAL CREDITS								**21**	**-**

[&] Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS201T	Materials Technology	ES	3	-	-	-	3	40 / 60
4	231GEB203T	Environmental Science for Mechanical Sciences	BS	2	-	-	-	2	40 / 60
5	231GES201T	Python Programming	ES	2	-	-	-	2	40 / 60
6	231GES204T	Engineering Mechanics for Mechanical Sciences	ES	3	1	-	-	4	40 / 60
7	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
PRACTICALS									
8	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
10	231GES211L	Programming Laboratory through Python	ES	-	-	3	1	2	60 / 40
TOTAL CREDITS								**23**	**-**

I Year - Biomedical Engineering

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES101T	Engineering Graphics	ES	2	-	3	1	4	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
PRACTICALS									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES115L	Basic Electrical Science Laboratory	ES	-	-	2	-	1	60 / 40
9	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**20**	**-**

& - Mandatory to complete the course

SEMESTER II									
S. No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231GES202T	Engineering Mechanics for Biomedical Engineers	ES	3	-	-	-	3	40 / 60
4	231GEB204T	Environmental Sciences for Biomedical Engineers	BS	2	-	-	-	2	40 / 60
5	231GES201T	Python Programming	ES	2	-	-	-	2	40 / 60
6	231BMC201T	Fundamentals of Biochemistry	PC	3	-	-	-	3	40 / 60
7	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
8	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
10	231BMC211L	Biochemistry Laboratory	PC	-	-	3	1	2	60 / 40
11	231GES211L	Programming Laboratory through Python	ES	-	-	3	1	2	60 / 40
TOTAL CREDITS								**24**	**-**

I Year - Civil Engineering

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES101T	Engineering Graphics	ES	2	-	3	1	4	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
PRACTICALS									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
9	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**21**	**-**

& - Mandatory to complete the course

SEMESTER II									
S. No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231CES201T	Materials Science for Civil Engineers	ES	3	-	-	-	3	40 / 60
4	231GEB203T	Environmental Science for Mechanical Sciences	BS	2	-	-	-	2	40 / 60
5	231GES201T	Python Programming	ES	2	-	-	-	2	40 / 60
6	231GES203T	Engineering Mechanics for Civil Engineers	ES	3	1	-	-	4	40 / 60
7	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
8	231GES215L	Introduction to Civil Engineering Projects	ES	1	-	-	-	1	100 / 00
PRACTICALS									
	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
10	231GES211L	Programming Laboratory through Python	ES	-	-	3	1	2	60 / 40
TOTAL CREDITS								**24**	**-**

I Year – Computer Science and Engineering

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES104T	Problem Solving through Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
8	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
10	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
11	231GES114L	Python Programming Laboratory	ES	-	-	3	1	2	60 / 40
12	231GEH111L	Induction Training[&]	MC	-	-	2	-	0	-
TOTAL CREDITS								**22**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS202T	Physics for Information Science	ES	3	-	-	-	3	40 / 60
4	231GEB201T	Environmental Science for Computing Sciences	BS	2	-	-	-	2	40 / 60
5	231CSC201T	Programming in C	PC	3	-	-	-	3	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
9	231CSC211L	C Programming Laboratory	PC	-	-	3	1	2	60 / 40
TOTAL CREDITS								**21**	**-**

I Year – Computer Science and Engineering (AIML)

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES104T	Problem Solving through Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
9	231GES114L	Python Programming Laboratory	ES	-	-	3	1	2	60 / 40
10	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**21**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS202T	Physics for Information Science	ES	3	-	-	-	3	40 / 60
4	231GEB201T	Environmental Science for Computing Sciences	BS	2	-	-	-	2	40 / 60
5	231CSC201T	Programming in C	PC	3	-	-	-	3	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
9	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
10	231CSC211L	C Programming Laboratory	PC	-	-	3	1	2	60 / 40
TOTAL CREDITS								**22**	**-**

I Year – Computer Science and Engineering (Cyber Security)

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES104T	Problem Solving through Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
8	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
10	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
11	231GES114L	Python Programming Laboratory	ES	-	-	3	1	2	60 / 40
12	231GEH111L	Induction Training[&]	MC	-	-	2	-	0	-
TOTAL CREDITS								**22**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS202T	Physics for Information Science	ES	3	-	-	-	3	40 / 60
4	231GEB201T	Environmental Science for Computing Sciences	BS	2	-	-	-	2	40 / 60
5	231CSC201T	Programming in C	PC	3	-	-	-	3	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
7	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
9	231CSC211L	C Programming Laboratory	PC	-	-	3	1	2	60 / 40
TOTAL CREDITS								**21**	**-**

I Year – Computer Science and Design

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES104T	Problem Solving through Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
9	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
10	231GES114L	Python Programming Laboratory	ES	-	-	3	1	2	60 / 40
11	231GEH111L	Induction Training[&]	MC	-	-	2	-	0	-
TOTAL CREDITS								**23**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS202T	Physics for Information Science	ES	3	-	-	-	3	40 / 60
4	231GEB201T	Environmental Science for Computing Sciences	BS	2	-	-	-	2	40 / 60
5	231CSC201T	Programming in C	PC	3	-	-	-	3	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
9	231CSC211L	C Programming Laboratory	PC	-	-	3	1	2	60 / 40
TOTAL CREDITS									**-**

I Year - Electronics and Communication Engineering

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES102T	Basic Civil and Mechanical Engineering	ES	3	-	-	-	3	40 / 60
6	231GEH101T	தமிழர்மரபு / Heritage of Tamils	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8									
9	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
10	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**20**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS203T	Materials Science for Electronics Engineering	ES	3	-	-	-	3	40 / 60
4	231GEB202T	Environmental Science for Electronic Sciences	BS	2	-	-	-	2	40 / 60
5	231GES201T	Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
7	231ECC201T	Electric Circuits and Electronic Devices	PC	3	1	-	-	4	40 / 60
LABORATORY									
	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
9	231ECC211L	Circuits and Devices Laboratory	PC	-	-	3	1	2	60 / 40
10	231GES211L	Programming Laboratory through Python	ES	-	-	3	1	2	60 / 40
TOTAL CREDITS								**25**	**-**

I Year - Electrical and Electronics Engineering

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES102T	Basic Civil and Mechanical Engineering	ES	3	-	-	-	3	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
10	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**20**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS204T	Electrical Engineering Materials	ES	3	-	-	-	3	40 / 60
4	231GEB202T	Environmental Science for Electronic Sciences	BS	2	-	-	-	2	40 / 60
5	231GES201T	Python Programming	ES	2	-	-	-	2	40 / 60
6	231EEC201T	Electric Circuit Analysis	PC	3	-	-	-	3	40 / 60
7	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
9	231EEC211L	Electric Circuits Laboratory	PC	-	-	4	-	2	60 / 40
10	231GES211L	Programming Laboratory through Python	ES	-	-	3	1	2	60 / 40
1TOTAL CREDITS								**24**	**-**

I Year - Mechanical Engineering

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES101T	Engineering Graphics	ES	2	-	3	1	4	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
PRACTICALS									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
9	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**21**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS201T	Materials Technology	ES	3	-	-	-	3	40 / 60
4	231GEB203T	Environmental Science for Mechanical Sciences	BS	2	-	-	-	2	40 / 60
5	231GES201T	Python Programming	ES	2	-	-	-	2	40 / 60
6	231GES204T	Engineering Mechanics for Mechanical Sciences	ES	3	1	-	-	4	40 / 60
7	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
8	231GES215L	Introduction to Civil Engineering Projects	ES	1	-	-	-	1	100 / 00
PRACTICALS									
9	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
10	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
11	231GES211L	Programming Laboratory through Python	ES	-	-	3	1	2	60 / 40
TOTAL CREDITS								**24**	**-**

I Year - Robotics and Automation

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES101T	Engineering Graphics	ES	2	-	3	1	4	40 / 60
6	231GES103T	Basic Electrical Engineering	ES	2	-	-	-	2	40 / 60
7	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
PRACTICALS									
8	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES113L	Basic Electrical Workshop	ES	-	-	2	-	1	60 / 40
10	231ROS111L	Computer Aided Drafting and Modeling Laboratory	ES	-	-	2	-	1	60 / 40
11	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**23**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB202T	Statistics and Numerical Methods	BS	3	1	-	-	4	40 / 60
3	231PYS203T	Materials Science for Electronics Engineering	ES	3	-	-	-	3	40 / 60
4	231GEB202T	Environmental Science for Electronic Sciences	BS	2	-	-	-	2	40 / 60
5	231GES201T	Python Programming	ES	2	-	-	-	2	40 / 60
6	231ROC201T	Basic Mechanics for Robotics	PC	3	1	-	-	4	40 / 60
7	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
PRACTICALS									
8	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
10	231GES211L	Programming Laboratory through Python	ES	-	-	3	1	2	60 / 40
TOTAL CREDITS								**23**	**-**

I Year – Artificial Intelligence and Data Science

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES104T	Problem Solving through Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
7									
8	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
10	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
11	231GES114L	Python Programming Laboratory	ES	-	-	3	1	2	60 / 40
12	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**22**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS202T	Physics for Information Science	ES	3	-	-	-	3	40 / 60
4	231GEB201T	Environmental Science for Computing Sciences	BS	2	-	-	-	2	40 / 60
5	231CSC201T	Programming in C	PC	3	-	-	-	3	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
9	231CSC211L	C Programming Laboratory	PC	-	-	3	1	2	60 / 40
TOTAL CREDITS								**21**	**-**

I Year – BioTechnology

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES101T	Engineering Graphics	ES	2	-	3	1	4	40 / 60
6	231GES105T	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	-	-	-	3	40 / 60
7	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
8	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
10	231GEH111L	Induction Training[&]	MC	-	-	2	-	0	-
TOTAL CREDITS								**24**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231BTC201T	Materials Science for Biotechnologists	PC	3	-	-	-	3	40 / 60
4	231BTC202T	Bioorganic Chemistry	PC	3	-	-	-	3	40 / 60
5	231GES201T	Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
9	231BTC211L	Bioorganic Chemistry Laboratory	PC	-	-	3	1	2	60 / 40
10	231GES211L	Programming Laboratory through Python	ES	-	-	3	1	2	60 / 40
TOTAL CREDITS								**22**	**-**

I Year – Computer Science and Business Systems

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES104T	Problem Solving through Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
9	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
10	231GES114L	Python Programming Laboratory	ES	-	-	3	1	2	60 / 40
11	231GEH111L	Induction Training[&]	MC	-	-	2	-	0	-
TOTAL CREDITS								**23**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB202T	Statistics and Numerical Methods	BS	3	1	-	-	4	40 / 60
3	231PYS202T	Physics for Information Science	ES	3	-	-	-	3	40 / 60
4	231GEB201T	Environmental Science for Computing Sciences	BS	2	-	-	-	2	40 / 60
5	231CSC201T	Programming in C	PC	3	-	-	-	3	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
7	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
8	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
9	231CSC211L	C Programming Laboratory	PC	-	-	3	1	2	60 / 40
TOTAL CREDITS								**20**	**-**

I Year – Information Technology

SEMESTER I									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH101T	Technical English	HS	3	-	-	-	3	40 / 60
2	231MAB101T	Matrices and Calculus	BS	3	1	-	-	4	40 / 60
3	231PYB101T	Engineering Physics	BS	3	-	-	-	3	40 / 60
4	231CYB101T	Engineering Chemistry	BS	3	-	-	-	3	40 / 60
5	231GES104T	Problem Solving through Python Programming	ES	2	-	-	-	2	40 / 60
6	231GEH101T	Heritage of Tamils / தமிழர்மரபு	HS	1	-	-	-	1	40 / 60
LABORATORY									
7									
8	231CYB011L	Chemistry Laboratory	BS	-	-	2	-	1	60 / 40
9	231GES011L	Basic Workshop Practice	ES	-	-	2	-	1	60 / 40
10	231GES114L	Python Programming Laboratory	ES	-	-	3	1	2	60 / 40
11	231GEH111L	Induction Training&	MC	-	-	2	-	0	-
TOTAL CREDITS								**20**	**-**

& - Mandatory to complete the course

SEMESTER II									
S.No	Course Code	Course Title	Category	Hours / Week				CREDITS	Internal / External %
				L	T	P	R		
THEORY									
1	231LEH201T	Professional Communication	HS	3	-	-	-	3	40 / 60
2	231MAB201T	Advanced Calculus and Complex Analysis	BS	3	1	-	-	4	40 / 60
3	231PYS202T	Physics for Information Science	ES	3	-	-	-	3	40 / 60
4	231GEB201T	Environmental Science for Computing Sciences	BS	2	-	-	-	2	40 / 60
5	231CSC201T	Programming in C	PC	3	-	-	-	3	40 / 60
6	231GEH201T	தமிழரும் தொழில்நுட்பமும் /Tamils and Technology	HS	1	-	-	-	1	40 / 60
LABORATORY									
	231PYB011L	Physics Laboratory	BS	-	-	2	-	1	60 / 40
7	231GES012L	Visualization of Design and Drawing	ES	-	-	3	1	2	60 / 40
8	231GES013L	Basic Electrical and Electronics Engineering Laboratory	ES	-	-	4	-	2	60 / 40
9	231CSC211L	C Programming Laboratory	PC	-	-	3	1	2	60 / 40
TOTAL CREDITS								**23**	**-**

SEMESTER I

231LEH101T	TECHNICAL ENGLISH (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To improve the communicative competence of learners
2.	To help learners use language effectively in academic /work contexts
3.	To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts
4.	To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
5.	To use language efficiently in expressing their opinions via various media.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Listen and comprehend lectures and talks in their area of specialization successfully.	K2
CO2:	Speak appropriately and effectively in varied formal and informal contexts.	K4
CO3:	Read technical texts.	K5
CO4:	Write Letters , Paragraphs, Descriptions.	K6
CO5:	Speak convincingly and express opinions on technical topics.	K6
CO6:	Communicate effectively through emails and analyze issues , technical articles and involve in speed writing.	K4

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	-	-	-	-	-	-	-	-	1	1	-	-
CO2	-	-	-	-	-	-	-	-	1	2	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	1	-	1
CO6	-	-	-	-	-	-	-	-	1	-	-	-
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I		**9**
Listening : Active listening -Types – Barriers **Speaking**: Self – introduction and introducing others / short conversation in formal and informal contexts- **Reading** : skimming and scanning – Intensive and extensive reading -**Writing**-Developing an outline– Developing hints **Vocabulary development and Grammar**: Parts of speech – Word formation – One word substitution – Phrasal verbs.		
UNIT	**TITLE**	**PERIODS**
II		**9**
Listening: Listening to Telephonic conversation – Etiquettes- Do's and Don'ts - **Speaking**:– Making technical and presentation- Presentation Do's and Don'ts - **Reading**:- Interpretative and critical levels of reading – **Writing** – Technical writing – letter (request/ permission/ complaint)- **Vocabulary and Grammar** –Tenses – Subject verb agreement –Pronoun (Possessive and Relative Pronoun)		
UNIT	**TITLE**	**PERIODS**
III		**9**
Listening: Listening to longer technical talks - **Speaking**: Expressing opinions – one to one debate – **Reading**: Comprehension- Pre- reading- post- reading - **Writing**- Email writing – Etiquette- Instructions and Recommendations - **Vocabulary and Grammar**: Adverbs – prepositions - Degrees of comparison (Comparative Degree)		
UNIT	**TITLE**	**PERIODS**
IV		**9**
Listening: Listening to speeches of formal and informal conversation and answer comprehension - **Speaking**: Sharing information of a personal kind – greeting- taking leave – routine action - Reading: Note making and summarizing – Paraphrasing -**Writing**-Writing a Paragraph – Paragraph Types **Vocabulary and Grammar**: If clause –– Articles – Sequence words – collocation– Conjunction.		
UNIT	**TITLE**	**PERIODS**
V		**9**
Listening: TED /INK talks – Note taking **Speaking**: Participating in group discussion – Do's and Don'ts **Reading:** Reading reviews, advertisement – Newspaper/ magazines / Short stories - **Writing:** Process and Product description **Vocabulary and Grammar:**– Figures of Speech– Embedded sentences – WH Questions / Yes/No questions / Question tag		

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	V. Chellamal, Deepa Mary Francis, K.N Shoba, P.R Sujatha Priyadharsini, Veena Selvam English for science and Technology, Cambridge University Press and Assessment 2023
REFERENCE BOOKS:	
1.	Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.
2.	A Course Book on Technical English By Lakshmi Narayanan, Scitech Publications (India) Pvt. Ltd.
3.	English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education,ISBN::0070264244.
4.	Effective Communication Skill, Kulbhusan Kumar, R S Salaria, Khanna Publishing House.
5.	Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

WEBSITES:	
1.	https://www.usingenglish.com
2.	http://grammarbook.com

JOURNALS:	
1.	National Council for Teachers of English
2.	https://www2.ncte.org/resources/journals/college-english/

EXTENSIVE READER:	
1.	Spencer Johnson, Who Moved My Cheese, Putnam Adult, 1998

COURSE DESIGNERS			
1.	Dr.Samuel Dawson	HoD	Department of English
2.	Dr.Usha Menon	Professor	Department of English
3.	Ms.Jean Ida	Assistant Professor	Department of English
4.	Ms.Moby	Assistant Professor	Department of English
5.	Ms.Surya S	Assistant Professor	Department of English
6.	Dr.Rudhra T S	Assistant Professor	Department of English

Recommended by Board of Studies		Syllabus version	1
Approved by the Academic Council		Meeting No.	7

231GEH101T	HERITAGE OF TAMILS / தமிழர்மரபு (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**1**	**0**	**0**	**0**	**1**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	சங்க இலக்கியங்கள் முதல் நவீன இலக்கியங்கள் வரையிலான வளர்ச்சியைப் பற்றி அறிய வைத்தல் To know about the development from Sangam literature to modern literature
2.	பாறை ஓவியங்கள் முதல் நவீன சிற்பங்கள் வரையிலான தமிழர் கலைகள் பற்றி அறிந்துகொள்ள வைத்தல் Learn about Tamil art from rock paintings to modern sculptures
3.	தமிழர்களின் நாட்டுப்புற கலைகள் மற்றும் வீர விளையாட்டுகள் பற்றி தெரிந்துகொள்ள வைத்தல் To know about folk arts and heroic games of Tamils
4.	தமிழர்கள் போற்றிய அகம் மற்றும் புறக் கோட்பாடுகள் பற்றி தெரிந்து கொள்ள வைத்தல் To know about internal and external principles cherised by Tamils.
5.	இந்தியப் பண்பாட்டில் தமிழர்களின் பங்களிப்பு பற்றி அறிந்து கொள்ள வைத்தல் To know about the contribution of Tamils in Indian culture

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to: இந்தப் பாடத்தினை கற்று முடிக்கும்போது, மாணவர்கள் கீழ்க்கண்டவற்றை பற்றி அறிந்திருப்பார்கள்:		Bloom's level
CO1:	சங்க இலக்கியங்கள் முதல் நவீன இலக்கியங்கள் வரையிலான வளர்ச்சியைப் பற்றி. On the Development from Sangam Literature to Modern Literature	K2
CO2:	பாறை ஓவியங்கள் முதல் நவீன சிற்பங்கள் வரையிலான தமிழர் கலைகள் பற்றி. About Tamil arts from rock paintings to modern sculptures.	K2
CO3:	தமிழர்களின் நாட்டுப்புற கலைகள் மற்றும் வீர விளையாட்டுகள் பற்றி. About folk arts and heroic games of Tamils	K2

CO4:	தமிழர்கள் போற்றிய அகம் மற்றும் புறக் கோட்பாடுகள் பற்றி. About internal and external principles cherished by Tamils.	K2
CO5:	இந்தியப் பண்பாட்டில் தமிழர்களின் பங்களிப்பு பற்றி. About the contribution of Tamils in Indian culture.	K2

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**LANGUAGE AND LITERATURE/மொழி மற்றும் இலக்கியம்**	**3**
Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.		
இந்திய மொழிக்குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் –சங்க இலக்கியத்தின் சமயச்சார்பற்றதன்மை- சங்கஇலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக்கருத்துக்கள்- தமிழ்க்காப்பியங்கள், தமிழகத்தில் சமணபௌத்த சமயங்களின் தாக்கம்பக்திஇலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில்நவீனஇலக்கியத்தின்வளர்ச்சி – தமிழ் இலக்கியவளர்ச்சியில் பாரதியார்மற்றும் பாரதிதாசன்ஆகியோரின் பங்களிப்பு.		

UNIT	**TITLE**	**PERIODS**
II	**HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE/ மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள்வரை- சிற்பக்கலை**	**3**
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.		
நடுகல் முதல் நவீன சிற்பங்கள்வரை – ஐம்பொன் சிலைகள்- பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர்செய்யும் கலை – சுடுமண் சிற்பங்கள் நாட்டுப்புறத் தெய்வங்கள் குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக்கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ். நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதாரவாழ்வில் கோவில்களின் பங்கு.		

UNIT	TITLE	PERIODS
III	**FOLK AND MARTIAL ARTS / நாட்டுப்புறக்கலைகள் மற்றும் வீரவிளையாட்டுகள்**	3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.		
தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான்கூத்து, ஒயிலாட்டம், தோல்பாவைக் சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.		

UNIT	TITLE	PERIODS
IV	**THINAI CONCEPT OF TAMILS /தமிழர்களின் திணைக்கோட்பாடுகள்**	3
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.		
தமிழகத்தின் தாவரங்களும், விலங்குகளும் தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் பறக்கோட்பாடுகள் தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககாலநகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி கடல் கடந்தநாடுகளில் சோழர்களின் வெற்றி.		

UNIT	TITLE	PERIODS
V	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE /இந்திய தேசியஇயக்கம்மற்றும்இந்தியபண்பாட்டிற்குத்தமிழர்களின்பங்களிப்பு**	3
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.		
இந்திய விடுதலைப் போரில் தமிழர்களின் பங்கு இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப்பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு-கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்ப்புத்தகங்களின் அச்சு வரலாறு.		

TOTAL PERIODS:	**15**

TEXT BOOKS CUM REFERENCE BOOKS:	
1.	தமிழக வாலாறு மக்களும் பண்பாடும் கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள்கழகம்).
2.	கணினித்தமிழ் - முனைவர்இல. சுந்தரம். (விகடன்பிரசுரம்).
3.	வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம் (தொல்லியல்துறை வெளியீடு)
4.	பொருறை - ஆற்றங்கரைநாகரிகம், தொல்லியல்துறைவெளியீடு)
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE DESIGNERS	
1.	Anna University, Chennai

Recommended by Board of Studies	Date:	Syllabus version	-
Approved by the Academic Council	Date:	Meeting No.	7

231MAB101T	MATRICES AND CALCULUS (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		3	2	0	0	4

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Basic Knowledge of Matrices and Determinants, Differentiation

COURSE OBJECTIVES:	
1.	To reduce quadratic form to canonical form of a matrix and identify its nature
2.	To analyze the convergence of infinite series
3.	To study the concept of evolutes and envelopes
4.	To find the extreme values for a function of two variables
5.	To solve Differential Equations using different techniques

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom"s level
CO1:	Reduce quadratic form to canonical form by orthogonal transformation and identify the nature of the quadratic form	K4
CO2:	Analyze the convergence of a given infinite series	K5
CO3:	Find evolute of a given curve and envelope of family of curves	K5
CO4:	Find the extreme of a linear function with two variables	K4
CO5:	Solve Ordinary differential equations with constant coefficients and variable coefficients	K6

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1	-	-	-	-	-	-	-	-	1
CO2	2	2	1	-	-	-	-	-	-	-	-	1
CO3	2	1	1	-	-	-	-	-	-	-	-	1
CO4	2	2	1	-	-	-	-	-	-	-	-	1
CO5	2	1	1	-	-	-	-	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : „-„ - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**MATRICES**	**9+3**

Characteristic equation – Eigen values and Eigenvectors of a real matrix – Properties of Eigen- values and Eigen-vectors, Cayley-Hamilton Theorem – statement and applications, Diagonalization of matrices by orthogonal transformation - Quadratic form – Reduction of a quadratic form to canonical form by Orthogonal transformation – Nature of quadratic forms

UNIT	**TITLE**	**PERIODS**
II	**SEQUENCES AND SERIES**	**9+3**

Sequences – Definition and examples, Series – Types of Convergence, Series of positive terms, Tests of convergence – Comparison test, Integral test and D'Alembert"s ratio test, Alternating series – Leibnitz's test.

UNIT	**TITLE**	**PERIODS**
III	**APPLICATIONS OF DIFFERENTIAL CALCULUS**	**9+3**

Curvature, radius of curvature – Cartesian and parametric co-ordinates – Centre of curvature – Circle of curvature in Cartesian form, Evolutes, Envelopes, Evolute as envelope of normals.

UNIT	**TITLE**	**PERIODS**
IV	**FUNCTIONS OF SEVERAL VARIABLES**	**9+3**

Partial derivatives – Total derivative – Differentiation of implicit functions – Jacobian and its properties – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT	**TITLE**	**PERIODS**
V	**ORDINARY DIFFERENTIAL EQUATIONS**	**9+3**

Solution of second and higher order linear differential equation with constants coefficients (Particular integrals involving f (x) = e^{mx}, sin mx, cos mx,x^m , e^{mx} f(x)). Euler's and Legendr's methods of solving Linear differential equations with variable coefficients, Method of variation of parameters.

TOTAL PERIODS:	**60**

TEXT BOOKS:	
1.	Joel Hass, Christopher Heil and Maurice D. Weir "Thomas" Calculus", 14th Edition, Pearson.
2.	Grewal.B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 44th Edition, 2018
3.	Work-Book on"" Matrices and Calculus", Chess Educational Publishers, prepared by Department of Mathematics

REFERENCE BOOKS:	
1.	Bali N P, Manish Goyal, “A Textbook of Engineering Mathematics”, Ninth Edition, Laxmi Publications Pvt Ltd, 2016.
2.	James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015
3.	Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
4.	Anton. H, Bivens. I and Davis. S, "Calculus", Wiley, 10th Edition, 2016

WEBSITES:	
1.	www.pearsoned.co.in/georgebthomasjr
2.	www.cengage.com/international
3.	https://onlinecourses.nptel.ac.in/noc21_ma58/unit?unit=1&lesson=2

COURSE DESIGNERS			
1.	Dr.S.Muthukumar	Professor	Department of Mathematics
2.	Dr.S.R.Ananthalakshmi	Associate Professor & HOD	Department of Mathematics
3.	Dr.K.S.Vidhyaa	Asst.Professor(Sr.G)	Department of Mathematics

Recommended by Board of Studies	Date:	Syllabus version	1
Approved by the Academic Council	Date:	Meeting No.	7

231PYB101T	ENGINEERING PHYSICS (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulations - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To impart knowledge on the basic principle of mechanics.
2.	To enable the students to gain knowledge on thermal physics.
3.	To explain the application of ultrasonics devices in engineering and medicine.
4.	To teach the description of various crystal structures and crystal defects for industrial applications.
5.	To learn the importance of laser and optical fibers for industry, telecommunication and medical applications.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Apply the basic principle of dynamics in torsional pendulum.	K3
CO2:	Evaluate the heat energy flow in thermal devices	K5
CO3:	Design ultrasonic devices for engineering and medical disciplines	K6
CO4:	Analyze the crystal structures and crystal defects for industrial applications.	K4
CO5:	Select the appropriate laser and optical fibers for industry, telecommunication and medical applications.	K4

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	-	-	-	-	-	1
CO2	3	2	1	-	-	-	-	-	-	-	-	1
CO3	3	2	1	-	-	-	-	-	-	-	-	1
CO4	3	2	1	-	-	-	-	-	-	-	-	1
CO5	3	2	1	-	-	-	-	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT I	**MECHANICS**	**9**

Multiparticle dynamics: Center of mass (CM) – CM of continuous bodies – motion of the CM – kinetic energy of system of particles. Rotation of rigid bodies: Rotational kinematics – rotational kinetic energy and moment of inertia - theorems of M.I – moment of inertia of uniform rod, circular disc, solid cylinder – M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – gyroscope – Torsional pendulum.

UNIT II	**THERMAL PHYSICS**	**9**

Fundamentals of thermal energy - Expansion joints - Bimetallic strips - Thermal conductivity, conductions in solids, Determination of thermal conductivity- Forbe's and Lee's disc method - Conduction through compound media – Thermal insulation – thermal shock resistance - Applications: Solar water heater- tempered glass- cryogenic materials.

UNIT III	**SOUND WAVES AND VIBRATIONS**	**9**

Propagation, Intensity, Loudness of sound waves – Determination of absorption coefficient, Reverberation, Sabine's formula for reverberation time - Factors affecting acoustics of buildings and their remedies - Ultrasonic waves and properties, Methods of Ultrasonic production, Applications of Ultrasonic in engineering and medicine.

UNIT IV	**CRYSTAL PHYSICS**	**9**

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - crystal imperfections: point defects, line defects – Burger vectors, stacking faults.

UNIT V	**APPLIED OPTICS**	**9**

Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion – He-Ne laser, CO2 laser, Semiconductor laser – Basic applications of lasers in industry. Principle and propagation of light in optical fibre, Derivation for Numerical aperture and Acceptance angle - Types and losses of optical fibre - Fibre Optical Communication (Block diagram) – Fibre Optic Endoscope.

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	R. K. Gaur and S. L. Gupta, Engineering Physics, Dhanpat Rai Pub., 2018.
2.	Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, Concepts of Modern Physics, McGraw- Hill (Indian Edition), 2017.
3.	D.Kleppner and R.Kolenkow, An Introduction to Mechanics. McGraw Hill Education (Indian Edition), 2017.

REFERENCE BOOKS:	
1.	Jeff Sanny, Samuel J. Ling, and William Moebs, University Physics, Volume 1- 3, OpenStax, ISBN-13: 978-1-947172-15-9, 2023.
2.	D.Halliday, R.Resnick and J.Walker. Principles of Physics, Wiley (Indian Edition), 2015.
3.	Paul A. Tipler, Physic – Volume 1 & 2, CBS, (Indian Edition), 2004.
4.	D.K.Bhattacharya & T.Poonam, Engineering Physics, Oxford University Press, 2015.
5.	V. Rajendran, Engineering Physics, McGraw Hill Publication, 2017.

WEBSITES:	
1.	https://www.britannica.com/technology/laser/Laser-applications
2.	https://en.wikipedia.org/wiki/Crystal_structure

COURSE DESIGNERS			
1.	Dr. S. Nirmala	Assoc Professor & Head	Department of Physics
2.	Dr. G. Rajkumar	Professor	Department of Physics
3.	Dr. R. Sivakumar	Asst Professor	Department of Physics
4.	Dr. K. Raju	Asst Professor	Department of Physics

Recommended by Board of Studies	Date:	Syllabus version	1
Approved by the Academic Council	Date:	Meeting No.	7

231CYB101T	ENGINEERING CHEMISTRY (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To explain water quality parameters and water treatment techniques
2.	To know about the polymers and polymer reinforced composites
3.	To gain knowledge about the types and applications of fuels
4.	To learn about various energy resources and storage devices
5.	To impart knowledge about the nanomaterials synthesis, properties and applications

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Identify an appropriate water treatment technique for the given water sample	K4, Analyze
CO2:	Choose an appropriate method for polymer synthesis and for fabrication of plastics.	K3, Apply
CO3:	Select a suitable fuel for given application, based on the combustion characteristics of fuel.	K3, Apply
CO4:	Construct the device for electricity generation from available energy.	K3, Apply
CO5:	Synthesize the nanomaterials for a given application	K3, Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	1	-	-	-	-	1
CO2	3	2	1	-	-	-	2	-	-	-	-	1
CO3	3	2	1	-	-	-	1	1	1	-	-	1
CO4	3	2	1	-	-	-	1	-	-	-	-	1
CO5	3	2	1	-	-	-	1	-	1	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**WATER AND ITS TREATMENT**	**9**

Introduction - types of impurities in water - water quality parameters: definition and significance of colour, odour, turbidity, pH, hardness, alkalinity, dissolved oxygen, chloride and fluoride - alkalinity - types and determination - hardness - types only - boiler feed water- requirements-boiler troubles - scale & sludge – disadvantages (wastage of fuels, decrease in efficiency, boiler explosion) - softening of hard water - external treatment process - demineralization and zeolite, internal treatment - boiler compounds (phosphate, calgon, carbonate and colloidal conditioning methods) – desalination of brackish water - reverse osmosis.

UNIT	**TITLE**	**PERIODS**
II	**POLYMERS AND FRP COMPOSITES**	**9**

Introduction- classification of polymers - natural and synthetic - thermoplastic and thermosetting, functionality – degree of polymerization,types - addition and condensation polymerization - free radical polymerization mechanism - preparation, properties and uses of PVC, Nylon 6,6, Teflon and Epoxy resin. Plastics - Compounding of plastics - moulding methods -injection, extrusion and compression – composites - definition, FRP composites

UNIT	**TITLE**	**PERIODS**
III	**FUELS AND COMBUSTION**	**9**

Classification - coal - proximate and ultimate analysis – carbonization - metallurgical coke - manufacture by Otto Hoffmann method - petroleum - refining - cracking -synthetic petrol by Bergius process – knocking in petrol and diesel engines- octane and cetane rating of fuels - synthesis - advantages and commercial application of alternate fuels (power alcohol, biodiesel and cryogenic fuel) - gaseous fuels - liquefied petroleum gases (LPG)- compressed natural gas (CNG) - Combustion of fuels: introduction - calorific value - higher & lower- theoretical calculation – flue gas analysis by Orsat method.

UNIT	**TITLE**	**PERIODS**
IV	**ENERGY SOURCES AND STORAGE DEVICES**	**9**

Energy - types - non-renewable energy - nuclear energy - fission and fusion reactions - differences between nuclear fission and fusion - nuclear chain reactions - light water nuclear reactor for power generation - breeder reactor - renewable energy - solar energy conversion - principle, working and applications of solar cells; recent developments in solar cell materials

Batteries - types of batteries - characteristics - construction and working of primary battery (dry cell) - secondary battery (lead acid battery and lithium-ion-battery), electric vehicles - working principles - fuel cells (H2-O2)

UNIT	TITLE	PERIODS
V	**NANO CHEMISTRY AND GREEN NANOTECHNOLOGY**	9
Introduction of Nano materials - distinction between nanoparticles, molecules and bulk materials – properties of nanomaterials - size dependent properties - synthesis – bottom up methods - precipitation, thermolysis (hydrothermal & solvothermal) - top down methods - electro-deposition, chemical vapour deposition, laser ablation – types of nanoparticles: nano cluster, nano-rod, nano-wire and nano-tube - carbon nano tube (synthesis and properties) - applications of nanoparticles. Green nanotechnology - nanotechnology products as potential substitutes for harmful chemicals, environmental concerns with nanotechnology		

TOTAL PERIODS:	**45**

TEXT BOOKS:

1.	Kannan P and Ravikrishnan A, - Engineering Chemistry, Sri Krishna, Hitech publishing Company Pvt. Ltd, 2023.
2.	Jain P.C. and Monika Jain, - Engineering Chemistry, Dhanpat Rai, Publishing Company (P) Ltd.,New Delhi, 2018.
3.	Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.

REFERENCE BOOKS:

1.	Dara S.S & S.S Umare, - A Text book of Engineering Chemistryll, S.Chand & Company Ltd., New Delhi, 2018.
2.	Palanna O.G, —Engineering Chemistryll, McGraw Hill Education (India)Pvt. Ltd, 2nd Edition, 2017.
3.	ShikhaAgarwal, “Engineering Chemistry-Fundamentals and Applications”, Cambridge University Press, Delhi, 2nd Edition, 2019.

WEBSITES:

1.	https://www.brainkart.com/subject/Engineering-Chemistry_264/
2.	https://www.poriyaan.in/paper/engineering-chemistry-4

JOURNALS:

1.	Journal of water technology and treatment methods
2.	Journal of polymers and composites
3.	Fuel and combustion scientific and research journal
4.	Journal of renewable and sustainable energy
5.	Journal of nanomaterials

EXTENSIVE READER:

1.	B. S. Murty, P. Shankar, Baldev Raj, B. B. Rath and James Murday, “Text book of nanoscience and nanotechnology”, Universities Press-IIM Series in Metallurgy and Materials Science, 2018.
2.	Friedrich Emich, “Engineering Chemistry”, Scientific International PVT, LTD, New Delhi, 2014.
3.	O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.

COURSE DESIGNERS			
1.	Dr. C. Ravichandran	Professor	Chemistry
2.	Dr. V. Vanitha	Assistant Professor	Chemistry
3.	Dr. K. Saravanan	Associate Professor	Chemistry

Recommended by Board of Studies	Date: 12-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES101T	ENGINEERING GRAPHICS (Common to MECH, CIVIL, BME, AUTO, RA)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**2**	**0**	**4**	**0**	**4**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To develop student's graphic skills for communication of concepts, ideas and design of engineering products.
2.	To expose them to existing National standards related to technical drawings.
3.	To Familiarize with basic geometrical constructions and orthographic projections.
4.	To make the students to draw the different projections of the solids.
5.	To draw the true shape and apparent shape of the sectioned solids and their developments.
6.	To draw 3D views through isometric projections.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Construct conic sections and cycloids	Apply
CO2:	Draw the projections of points, Straight lines and planes inclined to both the principal planes.	Apply
CO3:	Draw the projections of the simple solids like cylinder, cone, prisms and pyramids inclined to one of the principal planes.	Apply
CO4:	Draw the sectional views of simple solids, obtain true shape and develop the sectioned solids.	Apply
CO5:	Construct Orthographic views from pictorial views using drawing instruments and AutoCAD	Apply
CO6:	Draw the isometric view and isometric projection of simple and truncated solids in vertical position using drawing instruments and AutoCAD.	Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	1	-	1	2	2	-	1
CO2	3	3	2	-	-	1	-	1	2	2	-	1
CO3	3	3	2	-	-	1	-	1	2	2	-	1
CO4	3	3	2	-	-	1	-	1	2	2	-	1
CO5	3	3	2	-	3	1	-	1	2	2	-	1
CO6	3	3	2	-	3	1	-	1	2	2	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
0	**CONCEPTS AND CONVENTIONS USED (Not for Examination)**	**2**
Principles of Engineering graphics and their significance - Use Of drawing Instruments-BIS conventions and specifications-Size, Layout and folding of drawing sheets-Lettering and Dimensioning.		
UNIT	**TITLE**	**PERIODS**
I	**PLANE CURVES, PROJECTION OF POINTS**	**06 + 11**
Conic Sections - Construction of Ellipse, Parabola & hyperbola by eccentricity method – Construction of cycloid – Introduction to Scales. Introduction of Orthographic projection - Principal planes - First angle projection - projection of points		
UNIT	**TITLE**	**PERIODS**
II	**PROJECTION OF LINES AND PLANES**	**06 + 11**
Projection of straight lines inclined to both the principal planes by rotating line method. Projection of simple planes inclined to both the principal planes by rotating object method. Projection of simple solids like Prism, Pyramid, Cylinder and Cone when the axis is inclined to one of the principal planes by rotating object method		
UNIT	**TITLE**	**PERIODS**
III	**PROJECTION OF SOLIDS**	**06 + 11**
Projection of simple solids like Prism, Pyramid, Cylinder & Cone when the axis is inclined to one of the principal planes by rotating object method.		
UNIT	**TITLE**	**PERIODS**
IV	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES**	**06 + 11**
Sectioning of simple solids (Prism, Pyramid, Cylinder & Cone) in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of surfaces of right regular and sectioned solids		

UNIT	TITLE	PERIODS
V	**ISOMETRIC AND ORTHOGRAPHIC PROJECTIONS**	**06 + 11**
Principles of Isometric Projections-Isometric scale- Isometric Views of simple and truncated solids – combination of two solid objects in simple vertical positions. Conversion of Isometric views to Orthographic views of the objects. Introduction to perspective projections.		
UNIT	**TITLE**	**PERIODS**
VI	**COMPUTER AIDED DRAFTING: (Demonstration Only, Not for Exam)**	**3**
The Concepts of Computer Aided Drafting for Engineering drawing, Computer graphics & Geometrical modeling (2D Orthographic Views) and 3D drafting (Isometric Views) using AutoCAD.		

TOTAL PERIODS:	**90**

TEXT BOOKS:	
1.	Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
2.	Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009
3.	Venugopal K. and Prabhu Raja V., "Engineering Drawing with AUTOCAD and building drawing", New AgeInternational (P) Limited, 2018, 5th edition.

REFERENCE BOOKS:	
1.	Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
2.	Dinesh Kumar S, K.Sivakumar and R.Ramadoss, " Engineering Graphics", Maruthi Publishers, Chennai,2019.
3.	Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
4.	Jayapoovan T, "Engineering Graphics using AUTOCAD", Vikas Publishing ,7 th Edition.
5.	Parthasarathy N S and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
6.	Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

WEBSITES:	
1.	https://archive.nptel.ac.in/courses/112/102/112102304/
2.	https://onlinecourses.nptel.ac.in/noc23_me144/preview

JOURNALS (Publication of Bureau of Indian Standards):	
1.	IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets
2.	IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3.	IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings
4.	IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5.	IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

COURSE DESIGNERS			
1.	Dr. R. Ramadoss	Professor	Mechanical Engineering
2.	Dr. K. G. Ashok	Assistant Professor	Mechanical Engineering
3.	Mr. M. Raju	Assistant Professor	Mechanical Engineering

Recommended by Board of Studies	Date: 16-11-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES102T	Basic Civil and Mechanical Engineering (Common to ECE, EEE)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To impart basic knowledge on Civil and Mechanical Engineering.
2.	To familiarize the materials used in Civil Engineering
3.	To provide the exposure on the fundamental elements of civil engineering structures
4.	To enable the students to distinguish the components and working principle of power plant units and IC Engines.
5.	To provide the basic knowledge on working of Refrigeration and Air conditioning systems.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Identify the Civil and Mechanical Engineering concepts and their sub - disciplines.	Understand
CO2:	Determine the usage and proper selection of construction materials and usage of surveying techniques in various fields.	Apply
CO3:	Analyse different types of buildings, building components, building materials and building construction	Apply
CO4:	Illustrate the working of various types of power plants, IC engines and pumps	Apply
CO5:	Analyze the working cycles pertaining to refrigeration and air condition systems	Analyze

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	1	1	2	1	-	1	-	-	1	2
CO2	3	3	3	1	1	1	-	1	1	-	1	2
CO3	2	3	2	1	2	1	-	2	1	-	1	2
CO4	3	1	1	1	1	2	1	2	-	-	1	2
CO5	3	1	1	1	1	2	1	1	-	-	1	2
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**SCOPE OF CIVIL AND MECHANICAL ENGINEERING**	**PERIODS**
I		**9**

Overview of Civil Engineering - Civil Engineering contributions to the welfare of Society – Specialized sub disciplines in Civil Engineering – Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering.

Overview of Mechanical Engineering - Mechanical Engineering contributions to the welfare of Society – Specialized sub disciplines in Mechanical Engineering - Production, Automobile, Energy Engineering. Interdisciplinary concepts in Civil and Mechanical Engineering.

UNIT	**SURVEYING AND CIVIL ENGINEERING MATERIALS**	**PERIODS**
II		**9**

Surveying: Objects – classification – principles – measurements of distances –Application of surveying using GPS –Principles of remote sensing and GIS. Engineering Materials.

UNIT	**BUILDING COMPONENTS**	**PERIODS**
III		**9**

Components of building – Substructure and Superstructure – Foundation - Brick masonry –– beams - columns – roofing – flooring – plastering – floor area, carpet area and floor space index - water supply - sources and quality of water - Rain water harvesting.

UNIT	**INTERNAL COMBUSTION ENGINES AND POWER PLANTS**	**PERIODS**
IV		**9**

Classification of Power Plants - Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines –Working principle of steam, Gas, Diesel, Hydro - electric and Nuclear Power plants –- working principle of Boilers, Turbines, Reciprocating Pumps (single acting and double acting) and Centrifugal Pumps

UNIT	**REFRIGERATION AND AIR CONDITIONING SYSTEM**	**PERIODS**
V		**9**

Terminology of Refrigeration and Air Conditioning. Principle of vapour compression and absorption system– Layout of typical domestic refrigerator–Window and Split type room Air conditioner.

TOTAL PERIODS:	45

TEXT BOOKS:	
1.	Shanmugam G and Palanichamy MS,—Basic Civil and Mechanical Engineering‖, Tata McGraw Hill Publishing Co.,NewDelhi,1996.
2.	Anji Reddy M, —Text book of Remote sensing and Geographical Systems‖, BS Publications, 2015.

REFERENCE BOOKS:	
1.	Palanikumar, K. Basic Mechanical Engineering, ARS Publications, 2010.
2.	Ramamrutham S.,—Basic Civil Engineering‖, Dhanpat Rai Publishing Co.(P) Ltd.2013

WEBSITES:	
1.	Introduction to Civil Engineering Profession - Course (nptel.ac.in)
2.	https://youtu.be/LYvDoy7MtkE (NPTEL - Construction Materials)

JOURNALS:	
1.	International journal of civil Engineering (springer). (https://www.springer.com/journal/40999/)
2.	Construction and building materials (https://www.elsevier.com/journals/construction-and-building-materials/0950-0618)

COURSE DESIGNERS			
1.	Mr.A.Mohan	Assistant Professor	Civil Engineering
2.	Dr.M.Babu	Associate Professor	Mechanical Engineering

Recommended by Board of Studies	Date: 06-11-2023, 16-11-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES103T	BASIC ELECTRICAL ENGINEERING (for Robotics and Automation)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**2**	**0**	**0**	**0**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To impart knowledge on different circuit theorem and fundamentals of electric machines.
2.	To impart knowledge on different measuring instruments and different methods for measuring resistance, capacitance and inductance.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Compute the electric circuit parameters for a given DC circuit using theorems.	Apply
CO2:	Select DC machine based on its performance for given application.	Apply
CO3:	Select AC machine based on its performance for given application.	Apply
CO4:	Select instruments for measurement of electrical parameters.	Apply
CO5:	Calculate unknown values of resistance, capacitance and resistance using suitable bridges.	Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	1	-	-	-	-	-	-	-	1
CO2	3	1	1	-	-	-	-	-	-	-	-	1
CO3	3	1	1	-	-	-	-	-	-	-	-	1
CO4	3	1	1	-	-	-	-	-	-	-	-	1
CO5	3	2	1	-	-	-	-	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	TITLE	PERIODS
I	**ELECTRIC CIRCUITS**	6
Basic circuit components -, Ohms Law - Kirchoff's Law – Instantaneous Power – Inductors - Capacitors – Independent and Dependent Sources - steady state solution of DC circuits – Nodal analysis, Mesh analysis- Thevenin's Theorem, Norton's Theorem, Maximum Power transfer theorem- Linearity and Superposition Theorem. Representation of sinusoidal waveforms – Peak, RMS and Average values, Form Factor and Crest factor.		
UNIT	**TITLE**	**PERIODS**
II	**DC MACHINES**	6
DC Rotating Machines: Construction details – Principle of Operation as DC generator – EMF Equation and Symbolic Representation of DC generator - Principle of Operation as DC motor –Back EMF and its significance – Voltage, Power and Torque Equations		
UNIT	**TITLE**	**PERIODS**
III	**AC MACHINES & SPECIAL MOTORS**	6
Induction motor, Synchronous motor, Alternator, Servomotor, Universal motor, Stepper motor and Brushless DC motor: Construction – Working Principle – Types – Applications.		
UNIT	**TITLE**	**PERIODS**
IV	**ELECTRICAL INSTRUMENTS**	6
Moving Coil and Moving Iron Type Instruments: Construction and Principle of Operation Electrodynamometer type wattmeter - LPF wattmeter - Induction type kWh meter: Construction and Working		
UNIT	**TITLE**	**PERIODS**
V	**RESISTANCE, INDUCTANCE AND CAPACITANCE MEASUREMENT**	6
Ammeter, voltmeter method – Wheatstone bridge–Kelvin double bridge – Series and shunt type ohmmeter – High resistance measurement -Loss of charge method, Megohm bridge method – Megger. Q of coil – Maxwell Bridge – Wein's bridge–Schering bridge – Anderson bridge –Hay's bridge- Campbell bridge to measure mutual inductance.		
TOTAL PERIODS:		**30**

TEXT BOOKS:	
1.	D. P. Kothari and I.J Nagrath, "Basic Electrical Engineering", TaTa McGraw Hill Education, Second Edition, Second Edition 2002.
2.	B. L. Theraja and A. K. Theraja, "Electrical Technology Volume II: AC and DC Machines" S. Chand and Company Limited, 2020.
3.	E.W. Golding & F.C.Widdis, 'Electrical Measurements & Measuring Instruments', A.H. Wheeler & Co, 2001

REFERENCE BOOKS:	
1.	A.K. Sawhney, PuneetSawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi,January 2015.
2.	J.B.Gupta, 'A Course in Electronic and Electrical Measurements and Instrumentation',S.K.Kataria& Sons, Delhi, 2003.
3.	Martin U. Reissland, 'Electrical Measurement – Fundamental Concepts and Applications', New Age International (P) Ltd., 2001.
4.	A.K. Sawhney, PuneetSawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi,January 2015.

WEBSITES:	
1.	https://www.khanacademy.org/science/electrical-engineering
2.	https://archive.nptel.ac.in/courses/108/105/108105155/
3.	https://archive.nptel.ac.in/courses/108/105/108105153/

JOURNALS:	
1.	International Journal of Circuit Theory and Application, John Wiley and Sons Ltd.
2.	Journal of Electrical Engineering and Technology, Springer.

COURSE DESIGNERS			
1.	Dr. Arun Joseph	Assistant Professor	Robotics and Automation Department
2.	Mrs. K. Nandini	Assistant Professor	Robotics and Automation Department
3.	Dr. P. Marishkumar	Assistant Professor	EEE Department

Recommended by Board of Studies	Date: 16.11.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES104T	PROBLEM SOLVING THROUGH PYTHON PROGRAMMING (Common to CSE, CSE (CS), CSE (AIML), AI-DS, IT)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		2	0	0	0	2

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To introduce the basics of algorithmic problem solving
2.	To solve problems using Python conditionals and loops.
3.	To use Python function calls to solve problems.
4.	To impart Python data structures - lists, tuples, dictionaries to represent complex data
5.	To implement file operations using Python.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom"s level
CO1:	Solve problems using algorithms, flowchart and pseudocode.	Analyze
CO2:	Use python conditional and iteration statements for problem solving.	Apply
CO3:	Apply strings and user defined functions in python programming.	Apply
CO4:	Choose appropriate python data structures for real time applications.	Analyze
CO5:	Develop Python code to manipulate data using file and exception-handling.	Create

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	1	0	0	0	0	0	2	1	1
CO2	1	2	1	1	0	0	0	0	0	1	0	1
CO3	2	2	1	1	0	0	0	0	0	1	0	1
CO4	2	2	1	1	0	0	0	0	0	1	0	1
CO5	1	3	2	2	0	2	1	0	0	1	1	1
3 — High : 2 - Medium : 1 — Low : „-„ - No correlation												

UNIT	TITLE	PERIODS
I	ALGORITHMIC PROBLEM SOLVING	5
Fundamentals of Computing -Algorithms, building blocks of algorithms (statements, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).		
UNIT	TITLE	PERIODS
II	CONTROL FLOW STATEMENTS	7
Python interpreter, interactive mode and script mode; variables, expressions, statements; values and data types; Operators and Precedence of operators; Conditionals: conditional, alternative, chained conditional, nested conditional; Iterations: while, for, break, continue.		
UNIT	TITLE	PERIODS
III	FUNCTIONS AND STRINGS	6
Function definition and flow of execution, parameters and arguments; Fruitful functions, composition, recursion; Strings: string slices, immutability, Looping and counting, String methods.		
UNIT	TITLE	PERIODS
IV	LIST, TUPLE AND DICTIONARIES	8
Lists: list operations: list slices, , traversing, mutability, aliasing, list methods, list arguments, list comprehension; Tuples: Operations, tuple assignment; Dictionaries: Operations, functions and Looping.		
UNIT	TITLE	PERIODS
V	FILES, EXCEPTIONS	4
Files: Text files, reading and writing files,; Exceptions: handling exceptions, multiple exception blocks, finally block.		

TOTAL PERIODS:	30

TEXT BOOKS:	
1.	ReemaThareja —Python Programming using Problem solving Approach‖, Oxford University Press.

REFERENCE BOOKS:	
1.	Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter- disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
2.	Paul Gries, Jennifer Campbell and Jason Montojo, Practical Programming: An Introduction to Computer Science using Python 3‖, Second edition, Pragmatic Programmers, LLC, 2013.
3.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist, Version 2.0.17 edition, Updated for Python 3,Shroff/O_ReillyPublishers, (http://greenteapress.com/wp/thinkpython/)

WEBSITES:	
1.	https://www.python.org
2.	https://www.learnpython.org
3.	https://www.w3schools.com/python/

JOURNALS:	
1.	Nil

EXTENSIVE READER:	
1.	Nil

COURSE DESIGNERS			
1.	Dr.N.Ananthi	Professor & Head	Information Technology
2.	Dr.G.S.Anandha Mala	Professor & Head	Computer Science and Engineering
3.	Mrs.B.Chandra	Assistant Professor	Information Technology
4.	Dr.J.Deepa	Associate professor	Computer Science and Engineering
5	A.Jeba Sheela	Assistant Professor	Computer Science and Engineering

Recommended by Board of Studies	Date: 20-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES105T	**BASIC ELECTRICAL , ELECTRONICS AND INSTRUMENTATION ENGINEERING**	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION					
Duration of End Semester Examination in Hours	Marks			Minimum marks for Pass	
	Continuous assessment Examination	End Semester Examination	Maximum marks	End Semester Examination	Total
3	40	60	100	45	50

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To introduce the basics of electric circuits and analysis
2.	To impart knowledge in domestic wiring
3.	To impart knowledge in the basics of working principles and application of electrical machines
4.	To introduce analog devices and their characteristics
5.	To introduce the functional elements and working of sensors and transducers.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Compute the electric circuit parameters for simple problems	K3, Apply
CO2:	Map and describe the concepts of domestics wiring and protective devices	K3, Apply
CO3:	Determine and explain the working principle and applications of electrical machines	K3, Apply
CO4:	Analyze the characteristics of analog electronic devices	K4, Analyze
CO5:	Develop the types and operating principles of sensors and transducers for the instruments	K6, Create

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	1	-	-	-	-	1
CO2	3	3	2	-	-	-	1	-	-	-	-	1
CO3	3	3	2	-	-	-	1	-	-	-	-	1
CO4	3	3	2	-	-	-	1	-	-	-	-	1
CO5	3	3	2	-	-	-	1	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	ELECTRICAL CIRCUITS	**9**
DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor — Ohm's Law - Kirchhoff's Laws — Simple problems- Nodal Analysis, Mesh analysis with Independent sources only (Steady state) Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor — Steady state analysis of RLC circuits (Simple problems only), Three phase supply – star and delta connection — power in three-phase systems.		
UNIT	**TITLE**	**PERIODS**
II	MAGNETIC CIRCUITS AND ELECTRICAL INSTALLATIONS	**9**
Magnetic circuits-definitions-MMF, flux, reluctance, magnetic field intensity, flux density, fringing, self and mutual inductances-simple problems. Domestic wiring , types of wires and cables, earthing ,protective devices- switch fuse unit- Miniature circuit breaker-moulded case circuit breaker- earth leakage circuit breaker, safety precautions and First Aid		
UNIT	**TITLE**	**PERIODS**
III	ELECTRICAL MACHINES	**9**
Construction and Working principle- DC Separately and Self excited Generators, EMF equation, Types and Applications. Working Principle of DC motors, Torque Equation, Types and Applications. Construction, Working principle and Applications of Transformer, Three phase Alternator, Synchronous motor and Three Phase Induction Motor.		
UNIT	**TITLE**	**PERIODS**
IV	ANALOG ELECTRONICS	**9**
Resistor, Inductor and Capacitor in Electronic Circuits- Semiconductor Materials: Silicon &Germanium – PN Junction Diodes, Zener Diode –Characteristics Applications – Bipolar Junction Transistor-Biasing, JFET, SCR, MOSFET,IGBT — Types, I-V Characteristics and Applications, Rectifier and Inverters, harmonics		
UNIT	**TITLE**	**PERIODS**
V	SENSORS AND TRANSDUCERS	**9**
Sensors, solenoids, pneumatic controls with electrical actuator, mechatronics, types of valves and its applications, electro-pneumatic systems, proximity sensors, limit switches, piezoelectric, hall effect, photo		

sensors,Strain gauge, LVDT, differential pressure transducer,optical and digital transducers, Smart sensors, Thermal Imagers.

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	D P Kothari and I.J Nagarath, “Basic Electrical and Electronics Engineering”, McGraw HillEducation (India) Private Limited, Second Edition, 2020
2.	A.K. Sawhney, Puneet Sawhney ‘A Course in Electrical & Electronic Measurements &Instrumentation’, Dhanpat Rai and Co, 2015
3.	S.K. Bhattacharya, Basic Electrical Engineering, Pearson Education, 2019
4.	James A Svoboda, Richard C. Dorf, Dorf’s Introduction to Electric Circuits, Wiley,2018

REFERENCE BOOKS:	
1.	John Bird, “Electrical Circuit theory and technology”, Routledge; 2017.
2.	Thomas L. Floyd, ‘Electronic Devices’, 10th Edition, Pearson Education, 2018.
3.	Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education; 7th edition,201

WEBSITES:	
1.	https://lit.libguides.com/c.php?g=663698&p=4693660
2.	https://libguides.wintec.ac.nz/industrial_instrumentation_and_control/websites

JOURNALS:	
1.	https://www.sciencepublishinggroup.com/journal/239/home
2.	https://www.springeropen.com/p/engineering/electrical-engineering
3.	https://www.aimspress.com/journal/electreng
4.	https://lit.libguides.com/electrical-electronic-engineering/journals-databases
5.	https://www.inderscience.com/jhome.php?jcode=ijit

EXTENSIVE READER:	
1.	Muhammad H.Rashid, “Spice for Circuits and electronics”, 4th Edition.,Cengage India,2019.
2.	H.S. Kalsi, ‘Electronic Instrumentation’, Tata McGraw-Hill, New Delhi, 2010

COURSE DESIGNERS			
1.	Dr. G. Babu	HOD	Department of Biomedical Engineering
2.	Dr. K. Yamuna Devi	Assistant Professor	Department of Biomedical Engineering
3.	Dr. M. Neela Harish	Assistant Professor	Department of Biomedical Engineering
4.	Dr. S. Sathish	Assistant Professor	Department of Biomedical Engineering
5.	Mrs. B. Lakshmi Shree	Assistant Professor	Department of Biomedical Engineering

Recommended by Board of Studies	Date: 11.05.2024	Syllabus version	1
Approved by the Academic Council	Date:	Meeting No.	1

231PYB011L	PHYSICS LABORATORY (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	2	0	1

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To impart knowledge on experimental skills to determine elastic, optical and thermal properties of materials.
2.	To demonstrate the experimental determination of compressibility of liquid and band gap of a semiconductor.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	determine the elastic properties of materials using torsional pendulum and non uniform bending.	K3
CO2:	determine the optical properties of light waves using optical fibre, laser and spectrometer.	K3
CO3:	determine the physical properties of materials using Lee's disc apparatus and air wedge.	K3
CO4:	calculate the compressibility of liquid using ultrasonic interferometer.	K3
CO5:	calculate the band gap of a semiconductor using band gap apparatus.	K3

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	-	-	-	-	-	1
CO2	3	2	1	-	-	-	-	-	-	-	-	1
CO3	3	2	1	-	-	-	-	-	-	-	-	1
CO4	3	2	1	-	-	-	-	-	-	-	-	1
CO5	3	2	1	-	-	-	-	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

ANY FIVE EXPERIMENTS	
S. No	**NAME OF THE EXPERIMENT**
1	Torsion Pendulum – Rigidity modulus of wire and moment of inertia of disc
2	Non Uniform Bending – Determination of Young's modulus
3	Semiconductor Laser –Wavelength of laser light and Size of particle
4	Optical Fiber – Numerical Aperture and Acceptance Angle
5	Lee's Disc method - Determination of thermal conductivity of a bad conductor
6	Spectrometer – Dispersive power of the prism
7	Air Wedge – Measurement of thickness of thin wire
EXPERIMENTS BEYOND THE SYLLABUS	
ANY ONE EXPERIMENT	
1	Ultrasonic Interferometer - Velocity of sound and Compressibility of liquid
2	Determination of the Band gap of a semiconductor

TOTAL PERIODS:	**15**

REFERENCE BOOKS:	
1	Physics Laboratory Manual, Department of Physics, Easwari Engineering College.
2	R.K.Shukla and Anchal Srivastava, Practical Physics, 1st Edition, New Age International (P) Ltd, New Delhi, 2006.
3	G.L.Souires, Practical Physics, 4th Edition, Cambridge University, UK, 2001.
4	D.Chattopadhyay, P.C. Rakshit and B.Saha, An Advanced Course in Practical Physics, 2nd ed., Books & Allied Ltd., Calcutta, 1990.

COURSE DESIGNERS			
1.	Dr. S. Nirmala	Assoc Professor & Head	Department of Physics
2.	Dr. G. Rajkumar	Professor	Department of Physics
3.	Dr. R. Sivakumar	Asst Professor	Department of Physics
4.	Dr. K. Raju	Asst Professor	Department of Physics

Recommended by Board of Studies	Date: 12-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231CYB011L	CHEMISTRY LABORATORY (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**2**	**0**	**1**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To acquire practical skills in the determination of water quality parameters.
2.	To impart the students with the determination of the molecular weight of the polymer by using a viscometer.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Determine the water quality parameters like hardness and DO content.	K3, Apply
CO2:	Calculate the molecular weight and classify the polymers.	K3, Apply
CO3:	Estimate the strength of acids using instrumental techniques.	K3, Apply
CO4:	Analyze the alkalinity parameters of water.	K4, Analyze

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	1	-	-	-	-	1
CO2	3	2	-	-	-	-	1	-	-	-	-	1
CO3	3	2	-	-	-	-	1	-	-	-	-	1
CO4	3	2	-	-	-	-	1	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

List of experiments: (Any Five Experiments)
1. Determination of alkalinity in the given water sample 2. Estimation of total, temporary & permanent hardness of water by EDTA method 3. Determination of chloride content of water sample by Argentometric method 4. Find the molecular weight of PVA using Ostwald viscometer 5. Determine the strength of given strong acid using pH meter 6. Evaluate the strength of acids in a mixture by conductometric titration 7. Estimation of Fe2+ by Potentiometric titration 8. Determination of BOD and COD in water sample **Content beyond the syllabus: (Any one)** 9. Demonstrate the of DO Content of water sample by Wrinkler method 10. Estimation of Iron content of water sample using spectrophotometer (1,10 – Phenanthroline/ thiocyanate method)

TOTAL PERIODS:	**30**

TEXT BOOKS:	
1.	Dr. C. Ravichandran, “Engineering Chemistry Laboratory” Global publications, India, (2020)
2.	Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., “Vogel’s Textbook of practical organic chemistry, LBS Singapore (1994)

COURSE DESIGNERS			
1.	Dr. C. Ravichandran	Professor	Chemistry
2.	Dr. R. Anithadevi	Assistant Professor	Chemistry
3.	Dr. V.Vanitha	Assistant Professor	Chemistry

Recommended by Board of Studies	Date: 12.10.2023	Syllabus version	1.0
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES011L	**BASIC WORKSHOP PRACTICE** **(Common to all branches of Engineering and Technology)**	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**2**	**0**	**1**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To provide exposure to the students with the concepts involved in product realization by carrying out basic workshop exercises.
2.	Hands-on practice with exercises and assembly leading to realization of a new product in a group

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Prepare the pipe connections using pipes and joints	Apply
CO2:	Prepare welding joints using arc welding.	Apply
CO3:	Make carpentry joints.	Apply
CO4:	Prepare objects using sheet metal.	Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	1	-	1	3	1	2	2	-	1	3
CO2	3	-	1	-	1	3	1	2	2	-	1	3
CO3	3	-	1	-	1	3	1	2	2	-	1	3
CO4	3	-	1	-	1	3	1	2	2	-	1	3
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

LIST OF EXPERIMENTS
PART A - CIVIL ENGINEERING PRACTICE **Plumbing Works:** 1. Study of pipeline joints, its location and functions: Valves, Taps, Couplings, Unions, Reducers, Elbows in house hold fittings. 2. Connection of PVC pipes 3. Basic pipe connections involving the fitting like Valves, Taps and Bends **Carpentry works:** 4. Study of the joints in Roofs, Doors, Windows and Furniture. 5. Cross Lap joint 6. Dove Tail Joint **PART B - MECHANICAL ENGINEERING PRACTICE** **Welding:** 7. Introduction to Welding 8. Arc welding of Butt joints, Tap joints and Tee joints. 9. Gas welding practice **Sheet metal work:** 10. Introduction to sheet metal 11. Rectangular tray making 12. Funnel making **Group Task:** Model house creation using plumbing and carpentry tools.

TOTAL PERIODS:	**30**

TEXT BOOKS:	
1.	Hajara Choudhary, Bose S K, Elements of Workshop Technology Vol I and II, Asia Publishing House.

REFERENCE BOOKS:	
1.	Rao P N, Manufacturing Technology and Foundry, Forming and Welding, Tata McGrawHill publishing Company
2.	Parmar R S, Welding Process and Technology, Khanna Publisher.
3.	Jain R K, Production Technology, Khanna Publisher

WEBSITES:	
1.	https://pdf.usaid.gov/pdf_docs/PNAAM100.pdf
2.	https://content.kopykitab.com/ebooks/2016/06/7478/sample/sample_7478.pdf

JOURNALS:	
1.	https://www.irjet.net/archives/V6/i4/IRJET-V6I4824.pdf
2.	https://www.sciencedirect.com/science/article/pii/S2352710223012688

COURSE DESIGNERS			
1.	Dr. M. Vetrivel Sezhian	Professor	Mechanical Engineering
2.	Dr. A. Praveen Kumar	Assistant Professor	Mechanical Engineering

Recommended by Board of Studies	Date: 16-11-2023	Syllabus version	
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES012L	VISUALISATION OF DESIGN AND DRAWING (Common to AI&DS, CSE, CSE (AIML), CSE (CS), CSBS, CSD, ECE, EEE, IT	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**3**	**1**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To develop students, graphic skills for communication of concepts, ideas and design of engineering products
2.	To expose them to existing National standards related to technical drawings.
3.	To familiarize with basic geometrical constructions and orthographic projections using drafting software.
4.	To make the students to draw the different projections of the solids.
5.	To get an idea about 3D views through isometric projections.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Apply BIS and ISO standards in Engineering drawing.	Apply
CO2:	Use the CAD software for drawing the plane surfaces by rotating plane method.	Apply
CO3:	Apply the Projection concepts and drafting tools to the projection of simple solids.	Apply
CO4:	Construct orthographic projections from pictorial views of simple machine elements.	Apply
CO5:	Draw the pictorial views of prism, pyramid, cylinder, cone and combination of solids.	Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	2	-	3	1	-	1	2	2	-	1
CO2	3	3	2	-	3	1	-	1	2	2	-	1
CO3	3	3	2	-	3	1	-	1	2	2	-	1
CO4	3	3	2	-	3	1	-	1	2	2	-	1
CO5	3	3	2	-	3	1	-	1	2	2	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	TITLE	PERIODS
I	**BASIC CONVENTIONS USED IN ENGINEERING DRAWING AND INTRODUCTION TO COMPUTER GRAPHICS**	12

Principles of Engineering graphics and their significance - Use of drawing Instruments-BIS conventions and Specifications-Size, Layout and folding of drawing Sheets-Lettering and Dimensioning.

The Concepts of Computer Aided Drafting for Engineering drawing, Computer graphics & Geometrical modeling (2D Orthographic Views) and 3D drafting (Isometric Views) using AutoCAD.

List of Experiments:

1. Drawing of a title block with necessary text, projection symbol and lettering using CAD software.
2. Drawing of line, Planes (Polygonal and Circular surfaces).

UNIT	TITLE	PERIODS
II	**PROJECTION OF PLANES**	12

Projection of planes (polygonal and circular surfaces) inclined to one of the principal planes by rotating object method.

List of Experiments:

1. Drawing of plane Surface inclined to HP.
2. Drawing of plane Surface inclined to VP.

UNIT	TITLE	PERIODS
III	**PROJECTION OF SOLIDS**	12

Projection of simple solids like Prisms, Pyramids, Cylinder and Cone when the axis is inclined to one of the principal planes by rotating object method.

List of Experiments:

1. Drawing of simple solids like prism and pyramids when the axis is inclined to HP or VP.
2. Drawing of simple solids like cylinder and cone when the axis is inclined to HP or VP.

UNIT	TITLE	PERIODS
IV	**ORTHOGRAPIC PROJECTION**	12

Visualization concepts and Orthographic Projection - Layout of views – Orthographic Projection-Conversion of pictorial diagram into orthographic views

List of Experiments:

1. Drawing orthographic view of simple solids like Prism, Pyramids, Cylinder, Cone, etc, and dimensioning.
2. Drawing of orthographic views from the given pictorial diagram.

UNIT	TITLE	PERIODS
V	ISOMETRIC DRAWING	12

Principles of isometric view – Isometric view of simple solids – Prism, Pyramid, Cylinder, Cone, and combination of solids.

List of Experiments:

1. Drawing isometric projection of simple solids.
2. Modeling of 2D to 3D objects using drafting software

TOTAL PERIODS:	60

TEXT BOOKS:

1.	Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009
2.	Jayapoovan T, "Engineering Graphics using AUTOCAD", Vikas Publishing ,7 th Edition.
3.	Venugopal K. and Prabhu Raja V., "Engineering Drawing with AUTOCAD and building drawing", New Age International (P) Limited, 2018, 5th edition.

REFERENCE BOOKS:

1.	Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
2.	Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
3.	Dinesh Kumar S, K.Sivakumar and R.Ramadoss, " Engineering Graphics", Maruthi Publishers, Chennai,2019.
4.	Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
5.	Parthasarathy N S and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.
6.	Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.
7.	CAD software Theory and User Manuals.

WEBSITES:

1.	https://ieeexplore.ieee.org/abstract/document/6132125
2.	https://www.indianjournals.com/ijor.aspx?target=ijor:ajmr&volume=10&issue=1&article=039

JOURNALS (Publication of Bureau of Indian Standards):

1.	IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets
2.	IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3.	IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings
4.	IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5.	IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

COURSE DESIGNERS			
1.	Dr. R. Ramadoss	Professor	Mechanical Engineering
2.	Mr. R. Jeremiah	Assistant Professor	Mechanical Engineering
3.	Mr. M. Raju	Assistant Professor	Mechanical Engineering

Recommended by Board of Studies	Date: 16-11-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES013L	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY (Common to AI&DS, Automobile, BioTech, Civil, CSBS, CSD, CSE (AIML), CSE (CS), Mechanical, IT)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**4**	**0**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:	
Nil	
COURSE OBJECTIVES:	
1.	To train the students in residential wiring.
2.	To gain practical knowledge in performance characteristics of analog devices
3.	To acquire exposure in combinational circuits

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Carry out the simple electrical wiring of a residential building.	Apply
CO2:	Measure the electrical quantities using Energy meter and Megger	Apply
CO3:	Calculate the voltage and current parameters of given circuits using Kirchhoff's Laws.	Apply
CO4:	Analyze the characteristics of analog devices.	Analyze
CO5:	Construct combinational circuits with logic gates.	Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	-	-	-	-	-	1	-	-	1
CO2	3	2	2	-	-	-	-	-	1	-	-	1
CO3	3	2	2	-	-	-	-	-	1	-	-	1
CO4	3	2	2	-	-	-	-	-	1	-	-	1
CO5	3	2	2	-	-	-	-	-	1	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

LIST OF EXPERIMENTS	
1.	Fluorescent Lamp wiring.
2.	Staircase wiring.
3.	Fabricate and test a PCB layout for a given circuit.
4.	Study of Single-Phase Energy meter.
5.	Study of earth resistance measurement using Megger.
6.	Verification of Kirchhoff's Laws.
7.	Characteristics of PN and Zener Diodes.
8.	Characteristics of BJT.
9.	Half wave and Full Wave rectifiers.
10.	Study of Logic Gates.
11.	Implementation of Binary Adder and Subtractor.

TOTAL PERIODS:	**60**

REFERENCE BOOKS:	
1.	Mittle V.N, Arvind Mittal, "Basic Electrical Engineering", Tata Mc Graw Hill (India), Second Edition, 2013.
2.	Sedha R.S., "A Text Book of Applied Electronics", S. Chand & Co., 2014

COURSE DESIGNERS			
1.	Dr. M. Sujatha	Assistant Professor	EEE
2.	Mrs. D. Chandrakala	Assistant Professor	EEE
3.	Mrs. K. A. Indu Sailaja	Assistant Professor	EEE

Recommended by Board of Studies	Date: 30.10.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES113L	BASIC ELECTRICAL WORKSHOP (for Robotics and Automation)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**2**	**0**	**1**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous assessment Examination	End Semester Examination		Continuous assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

COURSE OBJECTIVES:	
1.	To provide practical knowledge to the students on basic electric circuits.
2.	To provide knowledge on the working of electrical measuring instruments.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Carry out connections for simple house hold wiring	APPLY
CO2:	Measure basic electrical parameters for a given circuit using measuring instruments	APPLY
CO3:	Apply the electrical theorems for a given circuit and find its electrical parameters.	APPLY

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	-	-	2	2	-	1
CO2	3	2	1	-	-	-	-	-	2	2	-	1
CO3	3	2	1	-	-	-	-	-	2	2	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

S. No	LIST OF EXPERIMENTS (Any eight)
1.	Verification of Ohm's law
2.	Verification of Kirchoff's laws
3.	Verification of Superposition theorem
4.	Verification of Thevenin's theorem
5.	Verification of Norton's theorem
6.	Residential house wiring using switches, fuse, indicator, lamp and energy meter.
7.	Fluorescent lamp wiring.

8.	Stair case wiring
9.	Measurement of electrical quantities – voltage, current, power & power factor inRLC circuit.
10.	Measurement of energy using single phase energy meter.

S. No	**EXPERIMENTS BEYOND THE SYLLABUS (Any one)**
1.	Measurement of resistance to earth of electrical equipment.
2.	Load test on separately excited DC generator .
3.	Measure the unknown Resistance by Wheatstone's bridge.

TOTAL PERIOD:	**30**

REFERENCE BOOKS:	
1.	V. N. Mittal and Arvind Mittal; "Basic Electrical Engineering" McGraw Hill
2.	Vincent DelToro, "Electrical Engineering Fundamentals", PHI second edition 2011
3.	Edward Hughes, "Electrical Technology,", Pearson Education

COURSE DESIGNERS			
1.	Dr. Arun Joseph	Assistant Professor	Robotics and Automation Department
.2.	Mrs. K. Nandhini	Assistant Professor	Robotics and Automation Department
3.	Dr. P. Marishkumar	Assistant Professor	EEE Department

Recommended by Board of Studies	Date: 16.11.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES114L	PYTHON PROGRAMMING LABORATORY (Common to CSE, CSE (CS), CSE (AIML), AI-DS, IT)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**3**	**1**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

COURSE OBJECTIVES:	
1.	To impart knowledge on problem solving approaches.
2.	To experiment with programming constructs in Python
3.	To practice various computing strategies for Python-based solutions to real world problems
4.	To use Python data structures - lists, tuples, dictionaries.
5.	To train inbuilding simple project using python.

COURSE OUTCOMES:		Bloom"s level
Upon completion of this course, student will be able to:		Analyze
CO1:	Develop algorithmic solutions to simple computational problems	Apply
CO2:	Implement programs in Python using conditionals and loops for solving problems	Apply
CO3:	Deploy functions to decompose a Python program	Apply
CO4:	Process compound data using Python data structures.	Apply
CO5:	Design python programs for file handling and exception handling.	Apply
CO6:	Create GUI application for user defined requirement.	Create

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	2	1	1	-	-	-	-	2	1	2
CO2	1	2	1	1	1	-	-	-	1	2	1	2
CO3	2	2	1	1	1	-	-	-	1	2	1	2
CO4	2	2	1	1	1	-	-	-	1	2	1	2
CO5	1	3	2	2	1	-	-	-	1	2	1	2
CO6	2	2	2	2	2	-	1	2	3	3	2	3
3 — High : 2 - Medium : 1 — Low : „-„ - No correlation												

LIST OF EXPERIMENTS		
1.	Identification and solving of simple real life or scientific or technical problems, and developing flow charts, algorithms and pseudocode for the same. (Electricity Billing / Retail shop billing/ Sin series/ weight of a motorbike/ Weight of a steel bar/ compute Electrical Current in Three Phase AC Circuit, etc.)	
2.	Python programming using simple statements and expressions (exchange the values of two variables/ circulate the values of n variables/ distance between two points).	
3.	Scientific problems using Conditionals and Iterative loops. (Number series/ Number Patterns/ pyramid pattern)	
4.	Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)	
5.	Implementing real-time/technical applications using Sets, Dictionaries. (Language/ components of an automobile / Elements of a civil structure etc.- operations of Sets & Dictionaries)	
6.	Implementing programs using Functions. (Factorial / largest number in a list/ area of shape)	
7.	Implementing programs using Strings. (reverse / palindrome / character count / replacing characters)	
8.	Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)	
9.	Implementing real-time/technical applications using Exception handling. (divide by zero error / voter‟s age validity / student mark range validation)	
10.	Exploring Pygame tool to Develop a game activity like bouncing ball, car race etc.	
11.	Mini Project (any ONE): Design GUI for • Airline reservation system • Feedback system • Employee management system • Student management system • Banking system	
TOTAL PERIODS:		**60**

EXPERIMENTS BEYOND THE SYLLABUS (Any one)	
1.	Implementing programs using written modules and Python Standard Libraries - pandas, numpy.
2.	Implementing programs using written modules and Python Standard Libraries - Matplotlib, spicy

COURSE DESIGNERS			
1.	Dr.N.Ananthi	Professor & Head	Information Technology
2.	Dr.G.S.Anandha Mala	Professor & Head	Computer Science and Engineering
3.	Mrs.B.Chandra	Assistant Professor	Information Technology
4.	Dr.J.Deepa	Associate professor	Computer Science and Engineering
5.	A.Jeba Sheela	Assistant Professor	Computer Science and Engineering

Recommended by Board of Studies	Date: 20-10-2023	Syllabus Version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES115L	BASIC ELECTRICAL SCIENCE LABORATORY (for Biomedical Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**2**	**0**	**1**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To handle basic electrical and electronic components/equipment
2.	To do staircase wiring and understand domestic wiring procedures
3.	To study and calibrate single phase energy meter
4.	To elaborate the basic electronic principles
5.	To apply logic circuits in to various applications

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to		Bloom's level
CO1:	Apply the skills of basic electrical engineering for house wiring practice	K3
CO2:	Measure various Electrical quantities	K5
CO3:	Exhibit ethical Principles in engineering practices	K4
CO4:	Apply the Electronic principles to develop circuits for primitive application	K3
CO5:	Analyze combinational logic circuits and clock circuits generation	K4

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)

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

3 – High : 2 - Medium : 1 – Low : '-' - No correlation

LIST OF EXPERIMENTS:	
1.	Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2.	Fluorescent lamp wiring.
3.	Stair case wiring
4.	Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
5.	Measurement of energy using single phase energy meter.
6.	Electronic components and equipment – Resistor, colour coding measurement of AC signal parameter (peak-peak, RMS period, frequency) using CR.
7.	Logic gates AND, OR, EX-OR and NOT.
8.	Generation of Clock Signal.
9.	Soldering practice – Components Devices and Circuits – Using general purpose PCB
CONTENT BEYOND SYLLABUS:	
10.	Measurement of resistance to earth of electrical equipment
11.	Measurement of ripple factor of HWR and FWR.

TOTAL PERIODS:	**30**

REFERENCE BOOKS:	
1	Basic Electrical Science Laboratory Manual, Department of Biomedical Engineering, Easwari Engineering College.
2	George Dudley Aspinall Parr, Practical Electrical Testing in Physics and Electrical Engineering,Hardpress Publishing, 2013

COURSE DESIGNERS			
1.	Dr. G. Babu	Professor & Head	Department of BME
2.	Dr. E. Kaliappan	Professor & Head	Department of EEE
3.	Dr. M. Devaraju	Professor & Head	Department of ECE

Recommended by Board of Studies	Date: 28.10.2023	Syllabus version	
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231ROS111L	COMPUTER AIDED DRAFTING AND MODELING LABORATORY (for Robotics and Automation)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**2**	**0**	**1**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To introduce the engineering drawing symbols and abbreviation used on the drawing.
2.	To provide hands on experience to develop 2D and 3D models of engineering components.
3.	To provide knowledge to use Drawing/Modeling software.

LIST OF EXPERIMENTS:	
1.	Study of capabilities of software for drafting and modeling-coordinate systems (absolute, relative, polar, etc.) - creation of simple shapes like polygon and general multi-line figures.
2.	Drawing of a Title Block with necessary text and projection symbol.
3.	Drawing of curves like parabola, spiral, involute using B spline or cubic spine.
4.	Drawing of front view and top view of simple solids like Prism, Pyramid, Cylinder, Cone, etc, and dimensioning.
5.	2D Sketch of a Gear.
6.	2D Sketch and 3D modelling of Sheet Metal Components
7.	3D Modelling of Mounting clamp for motor.
8.	Prepare assembly models -Flange Coupling
9.	Prepare assembly models -Robot gripper
10.	Prepare assembly models – Prismatic Joint
11.	Prepare assembly models – Rotary Joint
12.	Prepare assembly models - 2R manipulator

TOTAL PERIOD:	**30**

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Develop engineering drawing and dimensioning for the industrial component	APPLY
CO2:	Develop 2D and 3D models of the component using software	APPLY
CO3:	Perform assembly modeling and detailing of assembly drawings using software	APPLY

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	1	-	-	-	-	1	2	-	1
CO2	3	2	1	1	-	-	-	-	1	2	-	1
CO3	3	2	1	1	-	-	-	-	1	2	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

REFERENCE BOOKS:	
1.	Gopalakrishna K.R., "Machine Drawing", 17th Edition, Subhas Stores Books Corner, Bangalore, 2003.
2.	N. D. Bhatt and V.M. Panchal, "Machine Drawing", 51st Edition, Charator Publishers, 2022.
3.	Goutam Pohit and Goutam Ghosh, "Machine Drawing with AutoCAD", 1st Edition,Pearson Education, 2004
4.	S. Trymbaka Murthy, "A Text Book of Computer Aided Machine Drawing", CBS Publishers, New Delhi, 2007

COURSE DESIGNERS			
1.	Dr. M. Madhan	Assistant Professor	Robotics and Automation Department
.2.	Dr. S. Rajkamal	Assistant Professor	Robotics and Automation Department

Recommended by Board of Studies	Date: 16.11.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

SEMESTER II

231LEH201T	PROFESSIONAL COMMUNICATION (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To develop the basic writing skills of the First year Engineering students.
2.	To help learners develop their listening skills, which will, enable them to listen to lectures and enhance their ability to comprehend by asking questions and seeking clarification.
3.	To help learners develop their speaking skills and help them to speak fluently.
4.	To inculcate reading habit and to develop effective reading skills.
5.	To help students improve their active and passive vocabulary.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Listen, Understand and Respond to others in different situations	K2
CO2:	Speak correctly and fluently in different situations using appropriate communication strategies.	K4
CO3:	Read and Comprehend a range of texts adopting different reading skills.	K3
CO4:	Write with clarity in simple, apt and flawless language with coherence and cohesion.	K6
CO5:	Use their communicative competency with purpose and clarity in the context of Science and Technology	K6

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	-	-	-	-	-	-	-	-	1	1	-	-
CO2	-	-	-	-	-	-	-	-	1	2	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	1	-	1
CO6	-	-	-	-	-	-	-	-	1	-	-	-
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	Listening: Listening to talks and complete information gap exercises. (Comprehension).Speaking: Introduction to speaking mechanics. Reading: Prescribed non-detail text .Writing: Communication- Process/ forms /barriers. Vocabulary and Grammar: Purpose and function- Active/Passive voice/Impersonal passive voice - Numerical adjectives - Words used as different parts of speech – Contextual meaning of words	**9**
UNIT	**TITLE**	**PERIODS**
II	Listening: Listening to documentaries and interpret Speaking: Speaking an advertisements/ gadget reviews user manuals Reading: Prescribed non-detail text - Reading longer technical texts Writing: Interpreting Chart/ graphs – letter writing (placing order/ escalation/ complaint) Vocabulary and Grammar: Transformation of sentences –Simple, Complex, and Compound sentences- Modal verb –Infinity and Gerund – Error correction.	**9**
UNIT	**TITLE**	**PERIODS**
III	Listening: Listening to technical talk and making notes. Speaking: Describing a process. Reading: Prescribed non-detail text- reading editorials and opinion blogs. Writing: Essay writing (descriptive/ argumentative/ analytical/ narrative).Vocabulary and Grammar: Words often misspelt –Synonyms and antonyms – Modifiers – Direct / Indirect.	**9**
UNIT	**TITLE**	**PERIODS**
IV	Listening: Listening to Online interviews and discussion. Speaking: Small Talk (any random topics Reading: Prescribed non-detail text .Writing: Report Writing (accident/ industrial / Feasibility/ project) Vocabulary and Grammar: Extended definition – cause and effect expressions –Verbal analogies- Compound nouns.	**9**
UNIT	**TITLE**	**PERIODS**
V	Listening: Listening for taking notes and seeking clarifications. Speaking: Group Discussion- Etiquette/ Do's and Dont's. Reading:Prescribed non-detail text .Writing: Cover letter and Resume writing – Minutes of Meeting Vocabulary and Grammar: Collective noun - Relative clause – Redundancies.	**9**

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	V. Chellamal, Deepa Mary Francis, K.N Shoba, P.R Sujatha Priyadharsini, Veena Selvam English for science and Technology, Cambridge University Press and Assessment 2023
REFERENCE BOOKS:	
1.	Dutt P. Kiranmai and RajeevanGeeta. Basic Communication Skills, Foundation Books: 2013
2.	Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge,2011.
3.	Means,L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning ,USA: 2007.

WEBSITES:	
1.	https://www.usingenglish.com
2.	http://grammarbook.com

JOURNALS:	
1.	National Council for Teachers of English
2.	https://www2.ncte.org/resources/journals/college-english/

EXTENSIVE READER:	
1.	Spencer Johnson, Who Moved My Cheese, Putnam Adult, 1998

COURSE DESIGNERS			
1.	Dr Usha Menon	Professor	Department of English
2.	Dr Sam Dawson	Professor and Head	Department of English
3.	Ms Jean Ida	Assistant Professor	Department of English
4.	Ms Moby	Assistant Professor	Department of English
5	Ms Surya S	Assistant Professor	Department of English
6	Dr Rudhra T S	Assistant Professor	Department of English

Recommended by Board of Studies	Date: 12-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GEH201T	**Tamils and Technology /**தமிழரும் தொழில்நுட்பமும் (Common to all branches of Engineering and Technology)	**Periods per week**				**Credits**
		L	**T**	**P**	**R**	
Regulation - R23		1	0	0	0	1

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	தமிழர்கள் நெசவு மற்றும் பானைத் தொழிற்நுட்பங்களில் சிறந்து விளங்கியிருப்பதை அறிய வைத்தல்/ To know that Tamils have excelled in weaving and pottery techniques.
2.	கட்டிட வடிவமைப்பு மற்றும் கட்டிடத் தொழிற்நுட்பங்களில் தமிழர்கள் சிறந்து விளங்கியதை எடுத்துக்காட்டுகளுடன் அறிய வைத்தல்./ To Exemplify Tamil excellence in architectural design and construction techniques.
3.	கப்பல் கட்டுதல், இரும்புத் தொழில், நாணயம் அச்சிடுதல், மணி தயாரித்தல் போன்ற உற்பத்தித் தொழிற்நுட்பங்களில் தமிழர்கள் திறனுற்று விளங்கியதை அறிய வைத்தல்/ To show that Tamils were skilled in manufacturing techniques such as ship building, iron industry, coin minting, bell making etc.
4.	அணை, எரி, குளம், கிணறு போன்றவற்றை வடிவமைத்தல் மூலமாகவும் பராமரித்தல் மூலமாகவும் தமிழர்கள் வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழிற்நுட்பத்தில் சிறந்து விளங்கியதை அறிய வைத்தல்/ To promote Tamil excellence in agriculture and irrigation technology through design and maintenance of dams, streams, ponds, wells etc.
5.	அறிவியல் தமிழ் மற்றும் கணித் தமிழ் வளர்ச்சியையும் தமிழ் மென்பொருள் உருவாக்கம் பற்றியும் அறிய வைத்தல்/ To know about Scientific Tamil and Digital Tamil development and Tamil software development.

COURSE OUTCOMES (COs):		
இந்தப் பாடத்தினை கற்று முடிக்கும்போது, மாணவர்கள் கீழ்க்கண்டவற்றை பற்றி அறிந்திருப்பார்கள்:. Upon completion of this course, students will be aware of the following:		Bloom's level
CO1:	தமிழர்கள் நெசவு மற்றும் பானைத் தொழிற்நுட்பங்களில் சிறந்து விளங்கியிருப்பதைப் பற்றி./ About Tamils excelling in weaving and pottery techniques.	K2
CO2:	கட்டிட வடிவமைப்பு மற்றும் கட்டிடத் தொழிற்நுட்பங்களில் தமிழர்கள் சிறந்து விளங்கியது பற்றி./ About the excellence of Tamils in architectural design and construction techniques.	K2
CO3:	கப்பல் கட்டுதல், இரும்புத் தொழில், நாணயம் அச்சிடுதல், மணி தயாரித்தல் போன்ற உற்பத்தித் தொழிற்நுட்பங்களில் தமிழர்கள் திறனுற்று விளங்கியதைப் பற்றி./ About Tamils becoming proficient in manufacturing techniques like ship building, iron industry, coinage, bell making etc.	K2
CO4:	அணை, எரி, குளம், கிணறு போன்றவற்றை வடிவமைத்தல் மூலமாகவும் பராமரித்தல் மூலமாகவும் தமிழர்கள் வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழிற்நுட்பத்தில் சிறந்து விளங்கியதைப் பற்றி./ About how Tamils excelled in agriculture and irrigation technology by designing and maintaining dams, streams, ponds, wells etc.	K2
CO5:	அறிவியல் தமிழ் மற்றும் கணித் தமிழ் வளர்ச்சி பற்றியும் தமிழ் மென்பொருள் உருவாக்கம் பற்றியும் / About Development of Scientific Tamil and Digital Tamil and Tamil Software Development	K2

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1												
CO2												
CO3												
CO4												
CO5												
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	TITLE	PERIODS
I	**WEAVING AND CERAMIC TECHNOLOGY / நெசவு மற்றும் பானைத் தொழில்நுட்பம்**	**3**
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries		
சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் - பாண்டங்களில் கீறல் குறியீடுகள்.		
UNIT	**TITLE**	**PERIODS**
II	**DESIGN AND CONSTRUCTION TECHNOLOGY / வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**	**3**
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places -		

Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.		
சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு - சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் - சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும் கோவில்களும் - சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் - நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.		
UNIT	**TITLE**	**PERIODS**
III	**MANUFACTURING TECHNOLOGY / உற்பத்தித் தொழில் நுட்பம்**	**3**
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.		
கப்பல் கட்டும் கலை – உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பை உருக்குதல், எஃகு - வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கும் தொழிற்சாலைகள் - கல்மணிகள், கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்புத்துண்டுகள் - தொல்லியல் சான்றுகள் - சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.		
UNIT	**TITLE**	**PERIODS**
IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY / வேளாண்மை மற்றும் தீர்ப்பாசனத் தொழில் நுட்பம்**	**3**
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.		
அணை, எரி, குளங்கள், மதகு - சோழர்காலக் குமுத் நூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு - கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் - வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு - மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் - பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவுசார் சமூகம்.		
UNIT	**TITLE**	**PERIODS**
V	**SCIENTIFIC TAMIL & TAMIL COMPUTING / அறிவியல் தமிழ் மற்றும் கணித்தமிழ்**	**3**
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.		
அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ் மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் இணையத்தில் தமிழ் அகராதிகள்- சொற்குவைத் திட்டம்.		

TOTAL PERIODS:	**15**

TEXT BOOKS CUM REFERENCE BOOKS:	
1.	தமிழக வாலாறு மக்களும் பண்பாடும் கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2.	கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3.	வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருறை - ஆற்றங்கரை நாகரிகம், தொல்லியல் துறை வெளியீடு)
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

COURSE DESIGNERS	
1.	Anna University, Chennai

Recommended by Board of Studies	Date:	Syllabus version	-
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231MAB201T	ADVANCED CALCULUS AND COMPLEX ANALYSIS (Common to all branches of Engineering and Technology)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		3	2	0	0	4

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Basic Knowledge of Complex Variables, Vector Algebra and Integration

COURSE OBJECTIVES:	
1.	To compute area of closed surface and volume of solids using multiple integrals
2.	To evaluate Line, Surface and Volume integrals
3.	To find the Laplace Transforms and inverse transforms for standard functions
4.	To apply C-R equations in the construction of Analytic Functions
5.	To study the methods of Complex Integration, finding Taylor's and Laurent's Series expansions

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Find the area enclosed by simple closed curve using double integral and volume of solid using triple integral	K6
CO2:	Verify Green's, Stoke's and Gauss divergence theorems	K6
CO3:	Obtain Laplace Transforms and inverse transforms of standard functions.	K5
CO4:	Solve problems in Analytic functions and construct analytic functions by using C-R equations	K5
CO5:	Identify a suitable method of complex integration for evaluating certain indefinite integrals	K4

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	2	-	-	-	-	-	-	-	-	1
CO2	2	1	2	-	-	-	-	-	-	-	-	1
CO3	2	2	1	-	-	-	-	-	-	-	-	1
CO4	2	1	2	-	-	-	-	-	-	-	-	1
CO5	2	2	1	-	-	-	-	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**MULTIPLE INTEGRALS**	9+3
Double integrals in Cartesian and polar coordinates – Change of order of integration, Area enclosed by plane curves – Change of variables in double integrals, Triple integrals		
UNIT	**TITLE**	**PERIODS**
II	**VECTOR CALCULUS**	9+3
Gradient and directional derivative – Divergence and curl – Irrotational and Solenoidal vector fields, Line integral over a plane curve, Surface integral – Area of a curved surface, Volume integral, Green's, Gauss divergence and Stoke's theorems – Verification and application in evaluating line, surface and volume integrals (Cubes and Cuboids only)		
UNIT	**TITLE**	**PERIODS**
III	**LAPLACE TRANSFORM**	9+3
Definition, properties, existence conditions – Transforms of elementary functions – Transform of unit step function and unit impulse function, shifting theorems, transforms of derivatives and integrals, Initial and final value theorems, Periodic functions, Inverse transforms – Convolution theorem-, Solving linear second order ordinary differential equations with constant coefficients using Laplace transforms		
UNIT	**TITLE**	**PERIODS**
IV	**ANALYTIC FUNCTIONS**	9+3
Analytic functions – necessary and sufficient conditions, Cauchy-Riemann equations in Cartesian and polar form – Properties – harmonic functions, Construction of analytic function by Milne Thomson method, conformal mapping – some standard transformations w = z + c, cz, 1/z, bilinear transformation.		
UNIT	**TITLE**	**PERIODS**
V	**COMPLEX INTEGRATION**	9+3
Line integral – Cauchy's integral theorem – Cauchy's integral formula, Taylor's and Laurent's series, Singularities – Residues – Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour (except the poles on the real axis). line, surface and volume integrals.		
TOTAL PERIODS:		**60**

TEXT BOOKS:	
1.	Joel Hass, Christopher Heil and Maurice D. Weir “Thomas’ Calculus”, 14th Edition, Pearson.
2.	Grewal.B.S., “Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 44th Edition, 2018
3.	Workbook on”Advanced calculus and Complex Analysis”,Chess Publications,Prepared by Department of Mathematics

REFERENCE BOOKS:	
1.	Bali N P, Manish Goyal, “A Textbook of Engineering Mathematics”, Ninth Edition, Laxmi Publications Pvt Ltd, 2016.
2.	James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015
3.	Kreyszig.E, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
4.	T Veerarajan,” Engineering Mathematics II”, McGraw Hill (India) Private Limited, Chennai

WEBSITES:	
1.	www.pearsoned.co.in/georgebthomasjr
2.	www.webassign.net
3.	https://onlinecourses.nptel.ac.in/noc22_ma08/course

COURSE DESIGNERS			
1.	Dr.S.Muthukumar	Professor	Department of Mathematics
2.	Dr.S.R.Ananthalakshmi	HOD / Associate Professor	Department of Mathematics
3.	Dr.K.S.Vidhyaa	Assistant Professor (Sr.G)	Department of Mathematics

Recommended by Board of Studies	Date:12.10.2023	Syllabus version	V.1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231MAB202T	STATISTICS AND NUMERICAL METHODS (Robotics and Automation, Computer Science and Business Systems)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**2**	**0**	**0**	**4**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES: NIL

COURSE OBJECTIVES:

1.	This course aims at providing the necessary basic concepts of a few statistical and numerical methods and give procedures for solving numerically different kinds of problems occurring in engineering and technology.
2.	To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
3.	To introduce the basic concepts of solving algebraic and transcendental equations.
4.	To introduce the numerical techniques of interpolation in various intervals and numerical techniques of differentiation and integration which plays an important role in engineering and technology disciplines.
5.	To acquaint the knowledge of various techniques and methods of solving ordinary differential equations.

COURSE OUTCOMES (COs):

Upon completion of this course, student will be able to:		Bloom's level
CO1:	use the probability distribution to study discrete and continuous random variables.	K6
CO2:	find the acceptability of null hypothesis by applying testing of hypothesis for small and large samples.	K5
CO3:	solve algebraic, transcendental and simultaneous equations numerically.	K5
CO4:	use various numerical techniques to differentiate and integrate discrete functions.	K5
CO5:	find the numerical solutions of ordinary differential equations by using single step and multi step methods.	K4

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	-	-	-	-	-	-	-	-	2
CO2	3	3	3	-	-	-	-	-	-	-	-	2
CO3	3	3	3	-	-	-	-	-	-	-	-	2
CO4	3	3	3	-	-	-	-	-	-	-	-	2
CO5	3	3	3	-	-	-	-	-	-	-	-	2
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**SAMPLING DISTRIBUTION AND ESTIMATION**	9+3

Introduction to sampling distributions, sampling distribution of mean and proportion, application of central limit theorem, sampling techniques. Estimation: Point and Interval estimates for population parameters of large sample and small samples, determining the sample size.

UNIT	**TITLE**	**PERIODS**
II	**TESTING OF HYPOTHESIS AND DESIGN OF EXPERIMENTS**	9+3

Hypothesis testing: one sample and two sample tests for means and proportions of large samples (z-test), one sample and two sample tests for means of small samples (t-test), F-test for two sample standard deviations. ANOVA one and two way.

UNIT	**TITLE**	**PERIODS**
III	**SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS**	9+3

Solution of algebraic and transcendental equations –Fixed point iteration method-Newton Raphson method – Gauss elimination method – Gauss Jordan methods – Iterative methods of Gauss Jacobi and Gauss Seidel – Eigen values of a matrix by power method and Jacobi's method for symmetric matrices.

UNIT	**TITLE**	**PERIODS**
IV	**INTERPOLATION, NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION**	9+3

Lagrange's and Newton's divided difference interpolations – Newton's forward and backward difference interpolation – Approximation of derivates using interpolation polynomials –Numerical single and double integrations using Trapezoidal and Simpson's 1/3 rules.

UNIT	**TITLE**	**PERIODS**
V	**NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**	9+3

Single step methods: Taylor's series method – Euler's method – Modified Euler's method – Fourth order Runge- Kutta method for solving first order equations – Multi step methods: Milne's and Adams-Bash forth predictor corrector methods for solving first order equations.

TOTAL PERIODS:	60

TEXT BOOKS:	
1.	Grewal. B.S., and Grewal. J.S., "Numerical Methods in Engineering and Science",10th Edition,,Khanna Publishers, New Delhi, 2015.
2.	D.C. Montgomery, " Applied Statistics and Probability for Engineers", 6th Edition, 2016, ISV paper pack, Wiley publishers

REFERENCE BOOKS:	
1.	Burden, R.L and faires , J.D, "Numerical Analysis", 9th Edition, Cengage Learning,2016.
2.	Devore.J.L , "Probability and Statistics for Engineering and the Sciences",Cengage Learning,New Delhi,8th Edition,2014.
3.	Gerald. C.F., and Wheatley. P.O. "Applied Numerical Analysis" Pearson Education, Asia, New Delhi, 2006.
4.	Spiegel. M.R., Schiller. J., and Srinivasan. R.A., "Schaum's Outlines on Probability and Statistics", Tata McGraw Hill Edition, 2004.
5.	Walpole. R.E., Myers. R.H., Myers. S.L., and Ye. K., "Probability and Statistics for Engineers and Scientists", 8th Edition, Pearson Education, Asia, 2007.

WEBSITES:	
1.	https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2.	https://archive.nptel.ac.in/courses/127/106/127106019/

EXTENSIVE READER:	
1.	Understanding Statistics and Experimental Design: - Michael H. Herzog, Gregory Francis, Aaron Clarke 2019 Edition, Springer Publications.
2.	Numerical Methods for Engineers, -Steven C Chapra, Raymond P canale, Seventh Edition, McGraw Hill Education Limited.

COURSE DESIGNERS			
1.	Dr.S.Muthukumar	Professor	Department of Mathematics
2.	Dr.S.R.Ananthalakshmi	Associate Professor & HOD	Department of Mathematics
3.	Mr. E.Paramanathan	Assistant Professor	Department of Mathematics

Recommended by Board of Studies	Date: 12.10.2023	Syllabus version	V.1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231PYS201T	MATERIALS TECHNOLOGY (Common to Mechanical and Automobile Engineering)	Periods per week				Credits
		L	T	P	R	
Regulations - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To introduce the mechanism of crystallization and importance of phase diagrams in the field of materials science and engineering.
2.	To impart knowledge on electrical and magnetic properties of materials.
3.	To teach the principles of quantum mechanics and transport phenomena for semiconducting materials.
4.	To explain the functioning of optical materials for optoelectronics.
5.	To enable the students to gain knowledge on synthesis and fabrication of nanomaterials.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Evaluate the method of crystallization and importance of phase diagrams in the field of materials science and engineering	K5
CO2:	Analyze the classical and quantum electron theories towards the formation of energy bands and the properties of magnetic materials.	K4
CO3:	Apply the principles of quantum mechanics and transport phenomena for semiconducting materials.	K3
CO4:	Design the optical materials and devices for optoelectronics	K6
CO5:	Apply nanomaterials for energy storage systems	K3

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO2	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO3	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO4	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO5	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT I	**INTRODUCTION TO CRYSTALLINE MATERIALS**	**9**

Crystallography – Solid Solutions - Nucleation - Homogeneous and Heterogeneous Nucleation - Growth of Single crystals - solution and melt growth - Czochralski technique. Polycrystalline Materials- Principles of solidification – Crystal characterization using x-ray diffraction technique.

Phase Diagrams: Phase Rule – Unary System- Binary Phase diagrams - Isomorphous systems - Tie Line - Lever Rule - Eutectic, Peritectic, Eutectoid and Peritectoid Reactions - Typical Phase diagrams – Fe- Fe_3C system.

UNIT II	**ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS**	**9**

Classical free electron theory - Expression for electrical conductivity – Thermal conductivity, expression - Quantum free electron theory: Tunneling – degenerate states – Fermi - Dirac statistics – Density of energy states –– Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Dia, para and ferromagnetic effects – Para magnetism in the conduction electrons in metals – exchange interaction and ferromagnetism – quantum interference devices – GMR devices.

UNIT III	**SEMICONDUCTORS AND TRANSPORT PHYSICS**	**9**

Energy band diagram – Carrier concentration in intrinsic semiconductors– extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors (Qualitative Study) – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode – Introduction to solid state drive.

UNIT IV	**OPTICAL PROPERTIES OF MATERIALS**	**9**

Optical processes in semiconductors: optical absorption and emission, charge injection and recombination, optical absorption, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices – Electro-optics - Modulators and switching devices.

UNIT V	MATERIALS FOR ENERGY APPLICATIONS	9
Materials for energy storage: Properties of nano materials - carbon Nano-Tubes (CNT), Carbon Nano-Fibers (CNF), CNTs and CNFs for hydrogen storage. Advanced Batteries, Super capacitors for electro chemical energy storage - Role of carbon nanomaterials as electrodes in batteries and super capacitors - Fuel Cells and its applications.		
TOTAL PERIODS:		**45**

TEXT BOOKS:	
1.	V.Raghavan. Materials Science and Engineering: A First Course, Prentice Hall India Learning Private Limited, 2015.
2.	S.O. Kasap, Principles of Electronic Materials and Devices, Mc-Graw Hill, 2018.
3.	Jasprit Singh, Semiconductor Optoelectronics: Physics and Technology, Mc-Graw Hill India (2019).
4.	K.E. Aifantis, S.A. Hackney, and R. V. Kumar (Ed.) High Energy Density Lithium Batteries Materials, Engineering, Applications, WILEY-VCH Verlag GmbH & Co. KGaA, 2010.

REFERENCE BOOKS:	
1.	R.Balasubramaniam, Callister's Materials Science and Engineering. Wiley (Indian Edition), 2014.
2.	Wendelin Wright and Donald Askeland, Essentials of Materials Science and Engineering, CL Engineering, 2013.
3.	Robert F.Pierret, Semiconductor Device Fundamentals, Pearson, 2006.
4.	Pallab Bhattacharya, Semiconductor Optoelectronic Devices, Pearson, 2017.
5.	V. Hacker, S. Mitsushima(Eds.), Fuel Cells and Hydrogen: From Fundamentals to Applied Research, Elsevier, 2018.
6.	Sulabha K. Kulkarni, Nanotechnology: Principles and Practices, Springer, 2015.

WEBSITES:	
1.	https://archive.nptel.ac.in/courses/113/104/113104068/
2.	https://nptel.ac.in/courses/115102025

COURSE DESIGNERS			
1.	Dr. S. Nirmala	Associate Professor & Head	Department of Physics
2.	Dr. G. Rajkumar	Professor	Department of Physics
3.	Dr. R. Sivakumar	Assistant Professor	Department of Physics
4.	Dr. K. Raju	Assistant Professor	Department of Physics

Recommended by Board of Studies	Date: 12-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231PYS202T	PHYSICS FOR INFORMATION SCIENCE (Common to CSE, IT, CS, AIML and AI & DS)	Periods per week				Credits
		L	T	P	R	
Regulations - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To teach the principles of quantum mechanics and transport phenomena for semiconducting materials.
2.	To explain the functioning of optical materials for optoelectronics.
3.	To introduce the basic principles of quantum mechanics to one dimensional motion of particles.
4.	To enable the students to gain knowledge on applied quantum mechanics to form energy bands.
5.	To teach the basics of quantum structures and their applications and quantum computing.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Apply the principles of quantum mechanics and transport phenomena for semiconducting materials.	K3
CO2:	Design the optical materials and devices for optoelectronics	K6
CO3:	Apply the principles of quantum mechanics to one dimensional motion of particles.	K3
CO4:	Analyze the quantum mechanical principles towards the formation of energy bands.	K4
CO5:	Recommend the nano devices and nano materials for quantum computing	K5

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	-	-	-	-	-	1
CO2	3	2	1	-	-	-	-	-	-	-	-	1
CO3	3	2	1	-	-	-	-	-	-	-	-	1
CO4	3	2	1	-	-	-	-	-	-	-	-	1
CO5	3	2	1	-	-	-	-	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	TITLE	PERIODS
I	**SEMICONDUCTOR PHYSICS**	**9**

Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors (Qualitative study) – Variation of carrier concentration with temperature – variation of Fermi level with temperature and impurity concentration – Carrier transport in Semiconductor: random motion, drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode.

UNIT	TITLE	PERIODS
II	**LIGHT - SEMICONDUCTOR INTERACTION**	**9**

Classification of optical materials – carrier generation and recombination processes - Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only) - photo current in a PIN diode – solar cell - LED – Organic LED – Laser diodes – Optical data storage techniques.

UNIT	TITLE	PERIODS
III	**BASIC QUANTUM MECHANICS**	**9**

Inadequacies of Classical Mechanics – Black body radiation - Planck's theory of radiation - Dual nature of electromagnetic radiation – De Broglie hypothesis for matter waves – Heisenberg's uncertainty principle – Schrodinger's time dependent and independent wave equation, significance of wave function - Born interpretation - Particle confinement in 1D box.

UNIT	TITLE	PERIODS
IV	**APPLIED QUANTUM MECHANICS**	**9**

The harmonic oscillator - Barrier penetration and quantum tunneling – Scanning Tunneling Microscope (STM) - Resonant diode - Finite potential wells - Bloch's theorem for particles in a periodic potential – Basics of Kronig - Penney model and origin of energy bands.

UNIT	TITLE	PERIODS
V	**NANODEVICES AND QUANTUM COMPUTING**	9
Introduction - quantum confinement – quantum structures: quantum wells, wires and dots – band gap of nanomaterials. Tunneling – Single electron phenomena: Coulomb blockade – resonant tunneling diode – single electron transistor – quantum system for information processing - quantum states – classical bits – quantum bits or qubits – CNOT gate - multiple qubits – Bloch sphere – quantum gates – advantage of quantum computing over classical computing.		

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	Jasprit Singh, “Semiconductor Devices: Basic Principles”, Wiley (Indian Edition), 2007.
2.	S.O. Kasap. Principles of Electronic Materials and Devices, McGraw-Hill Education (Indian Edition), 2020.
3.	Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.

REFERENCE BOOKS:	
1.	Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
2.	Y. B. Band and Y. Avishai, Quantum Mechanics with Applications to Nanotechnology and Information Science, Academic Press, 2013.
3.	B. Rogers, J.Adams and S.Pennathur, Nanotechnology: Understanding Small Systems, CRC Press, 2014.
4.	Nouredine Zettili, Quantum Mechanics Concepts and Applications, 2nd Edition, Wiley, 2009.
5.	V.Rajendran, Materials Science, McGraw Hill Education (India) Private Ltd., 2017.
6.	G. Aruldhas, Quantum Mechanics, PHI Learning, 2008.

WEBSITES:	
1.	https://nptel.ac.in/courses/115102025

COURSE DESIGNERS			
1.	Dr. S. Nirmala	Associate Professor & Head	Department of Physics
2.	Dr. G. Rajkumar	Professor	Department of Physics
3.	Dr. R. Sivakumar	Assistant Professor	Department of Physics
4.	Dr. K. Raju	Assistant Professor	Department of Physics

Recommended by Board of Studies	Date: 12-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231PYS203T	MATERIALS SCIENCE FOR ELECTRONICS ENGINEERING (Common to Electronics and Communication Engineering, Robotics and Automation)	Periods per week				Credits
		L	T	P	R	
Regulations - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To impart knowledge on electrical and magnetic properties of materials.
2.	To teach the principles of quantum mechanics and transport phenomena for semiconducting materials.
3.	To introduce the concepts of dielectric materials and insulators.
4.	To explain the functioning of optical materials for optoelectronics.
5.	To enable the students to gain knowledge on smart materials and nanomaterials.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Analyze the classical and quantum electron theories towards the formation of energy bands and the properties of magnetic materials.	K4
CO2:	Apply the principles of quantum mechanics and transport phenomena for semiconducting materials.	K3
CO3:	Evaluate the dielectric strength of dielectric materials in static and alternating field	K5
CO4:	Design the optical materials and devices for optoelectronics	K6
CO5:	Select the smart materials for applications in engineering and technology	K4

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	-	-	-	-	-	1
CO2	3	2	1	-	-	-	-	-	-	-	-	1
CO3	3	2	1	-	-	-	-	-	-	-	-	1
CO4	3	2	1	-	-	-	-	-	-	-	-	1
CO5	3	2	1	-	-	-	-	-	-	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT I	**ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS**	**9**
Classical free electron theory - Expression for electrical conductivity and Thermal conductivity – Fermi - Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole. Magnetic materials: Diamagnetism, Para magnetism, Ferromagnetism - exchange interaction - Soft & Hard Magnetic material. Quantum interference devices – GMR devices and applications.		
UNIT II	**SEMICONDUCTORS AND TRANSPORT PHYSICS**	**9**
Intrinsic Semiconductors – Energy band diagram – direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors– extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors (Qualitative Study) – Variation of carrier concentration with temperature – Carrier transport in Semiconductors: Drift, mobility and diffusion – Hall effect and devices – Ohmic contacts – Schottky diode – Introduction to solid state drive.		
UNIT III	**DIELECTRIC MATERIALS**	**9**
Dielectric polarization and relative permittivity: definition – dipole moment and polarization vector Polarization mechanisms: electronic, ionic, orientational, interfacial and total polarization – frequency dependence – local field and Clausius-Mosotti equation – dielectric constant and dielectric loss – dielectric strength - dielectric breakdown – capacitor materials – typical capacitor constructions.		
UNIT IV	**OPTICAL PROPERTIES OF MATERIALS**	**9**
Optical absorption and emission, charge injection and recombination, loss and gain. Optical processes in quantum wells – Optoelectronic devices: light detectors and solar cells – light emitting diode – laser diode - optical processes in organic semiconductor devices – excitonic state – Electro-optics - Modulators and switching devices.		
UNIT V	**SMART MATERIALS AND NANOMATERIALS**	**9**
Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): characteristics, properties and applications of Ni-Ti alloy – Nanomaterials - Quantum size effect - Quantum dot, Wire and Well - Carbon nanotube and its types, Potential uses of nanomaterials in electronics, robotics, computers, sensors, mobile electronic devices –Classification of Biomaterials and its applications.		

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
2.	Umesh K Mishra and Jasprit Singh, Semiconductor Device Physics and Design, Springer, 2008.
3.	M.A.Wahab, Solid State Physics: Structure and Properties of Materials, Narosa Publishing House, 2009.

REFERENCE BOOKS:	
1.	S.O.Pillai, Solid State Physics, New Age International (P) Ltd., publishers, 2009.
2.	V.Rajendran, Materials Science, Mc Graw Hill Education (India) Private Ltd., 2017.
3.	Charles Kittel, Introduction to Solid State Physics, Wiley India Edition, 2019.
4.	Lawrence H. Vanvlack, Elements of Material Science and Engineering, Pearson, 2002.
5.	David Jiles, Introduction to the Electronic Properties of Materials, CRC Press, e-book, 2017.
6.	Charles P. Poole Jr., Frank J. Owens, Introduction to nano technology, Wiley, 2003.
7.	Mark Fox, Optical Properties of Solids, Oxford Univ.Press, 2001.

WEBSITES:	
1.	https://archive.nptel.ac.in/courses/113/105/113105081/
2.	https://nptel.ac.in/courses/115102025

COURSE DESIGNERS			
1.	Dr. S. Nirmala	Associate Professor & Head	Department of Physics
2.	Dr. G. Rajkumar	Professor	Department of Physics
3.	Dr. R. Sivakumar	Assistant Professor	Department of Physics
4.	Dr. K. Raju	Assistant Professor	Department of Physics

Recommended by Board of Studies	Date: 12-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231PYS204T	ELECTRICAL ENGINEERING MATERIALS (For Electrical and Electronics Engineering)	Periods per week				Credits
		L	T	P	R	
Regulations - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To impart knowledge on electrical properties of materials.
2.	To introduce the concepts of dielectric materials and insulators.
3.	To explain the importance of magnetic properties and superconductivity.
4.	To teach the principles of quantum mechanics for semiconducting materials.
5.	To enable the students to gain knowledge on nanomaterials.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Analyze the classical and quantum electron theories towards the formation of energy bands.	K4
CO2:	Evaluate the dielectric strength of dielectric materials in static and alternating field	K5
CO3:	Compare the properties of magnetic materials and superconductors for electrical engineering	K4
CO4:	Apply the principles of quantum mechanics for semiconducting materials.	K3
CO5:	Develop the nanomaterials and nano devices for electrical engineering	K6

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO2	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO3	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO4	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
CO5	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT I	**CONDUCTIVITY OF METALS**	**9**
Classical free electron theory - Ohm's law and relaxation time of electrons, collision time and mean free path, electron scattering and resistivity of metals - Expression for electrical conductivity and thermal conductivity - temperature dependence of resistivity - skin effect - Fermi- Dirac statistics – Density of energy states – Electron in periodic potential – Energy bands in solids – tight binding approximation - Electron effective mass – concept of hole.		
UNIT II	**DIELECTRIC PROPERTIES OF INSULATORS IN STATIC AND ALTERNATING FIELD**	**9**
Definitions: Relative permittivity, dipole moment and polarization vector - Polarization mechanisms: electronic, ionic, orientational, interfacial polarization - Frequency dependence of Electronic and Ionic Polarizability - Dielectric constant of mono-atomic gases, poly-atomic molecules and solids, Internal field in solids and liquids – Clausius - Mosotti equation - properties of Ferro-Electric and Piezo-Electric materials, dielectric losses - dielectric strength-dielectric breakdown.		
UNIT III	**MAGNETIC PROPERTIES AND SUPERCONDUCTIVITY**	**9**
Magnetic Material Classification - Domain Theory of Ferro magnetism - Curie-Weiss Law -Soft and Hard Magnetic Materials. Quantum interference devices – GMR devices and applications. Superconductivity and its origin - Zero resistance and Meissner Effect - critical current density - Properties – Type I and Type II superconductors – BCS theory of superconductivity (Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.		
UNIT IV	**SEMICONDUCTOR MATERIALS**	**9**
Classification of semiconductors, semiconductor conductivity, Carrier concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors (Qualitative Study) – Variation of carrier concentration with temperature – Trends in materials used in Electrical Equipment - Hall effect and devices – Introduction to solid state drive.		
UNIT V	**NANO DEVICES**	**9**
Introduction to Nanomaterials - Energy values for 0D, 1D, 2D and 3D – Quantum confinement – Quantum structures – Density of states for quantum wells, wires and dots – Band gap of nanomaterials – Carbon		

nanotubes : Types, properties and applications - Tunneling – Single electron phenomena – Single Electron Transistor. Conductivity of metallic nanowires – Ballistic transport – Quantum resistance and conductance – Spintronic devices and applications.

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	Electrical Engineering Materials Adrianus J Dekker, Phi Learning Publishers.
2.	Introduction to Electrical Engineering Materials 4th Edn. 2004 Edition by Indulkar C, S. Chand & Company Ltd-New Delhi.
3.	Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi.

REFERENCE BOOKS:	
1.	S.O. Kasap. Principles of Electronic Materials and Devices, McGraw Hill Education (Indian Edition), 2020.
2.	Umesh K Mishra and Jasprit Singh, Semiconductor Device Physics and Design, Springer, 2008.
3.	M.A.Wahab, Solid State Physics: Structure and Properties of Materials, Narosa Publishing House, 2009.
4.	V.Rajendran, Materials Science, Mc Graw Hill Education (India) Private Ltd., 2017.
5.	G.W.Hanson. Fundamentals of Nanoelectronics. Pearson Education.

WEBSITES:	
1.	https://archive.nptel.ac.in/courses/113/105/113105081/
2.	https://nptel.ac.in/courses/115102025

COURSE DESIGNERS			
1.	Dr. S. Nirmala	Associate Professor & Head	Department of Physics
2.	Dr. G. Rajkumar	Professor	Department of Physics
3.	Dr. R. Sivakumar	Assistant Professor	Department of Physics
4.	Dr. K. Raju	Assistant Professor	Department of Physics

Recommended by Board of Studies	Date: 12-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231CES201T	MATERIALS SCIENCE FOR CIVIL ENGINEERS (for Civil Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To gain knowledge about the various materials used in the buildings
2.	To know the types of floors and roofs, damp proof courses
3.	To understand various types of timbers, paints and modern materials.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Apply various types of masonry and materials used for construction of masonry	Apply
CO2:	Evaluate the properties of the materials for floors	Apply
CO3:	Evaluate various types of materials for roofs	Apply
CO4:	Evaluate various types of Glass and Painting Materials	Apply
CO5:	Evaluate the appropriate usage of modern materials	Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)

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

3 – High : 2 - Medium : 1 – Low : '-' - No correlation

UNIT	TITLE	PERIODS
I	**MATERIALS FOR MASONRY**	9
Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use – Refractory bricks – Concrete blocks – Lightweight concrete blocks.		
UNIT	**TITLE**	**PERIODS**
II	**MATERIALS FOR FLOORS**	9
Lime - Cement – Preparation of mortar – Components of Floors, Flooring material - Mosaic, Marble, Granite, Tile flooring, Cladding of tiles. DPC, Causes of dampness; Methods of preventing dampness; Damp proofing materials, DPC treatment in Buildings Anti-termite treatment, site preparation, soil treatment and post construction treatment.		
UNIT	**TITLE**	**PERIODS**
III	**MATERIALS FOR ROOFS**	9
Roof- Requirement of good roof, Types of roof, Trussed roof - King post Truss, Queen Post Truss- roofing materials – Stair - Types – materials Timber – Market forms – Industrial timber– Plywood – Veneer – Thermocol – Panels of laminates – Steel – various forms – Aluminum and Other Metallic Materials – Composition – Aluminium composite panel – Market forms		
UNIT	**TITLE**	**PERIODS**
IV	**GLASS AND OTHER MATERIALS**	9
Glazing – aluminum frames – Sealants for joints—polymeric materials –rubber-plastic-properties. Paints, Enamels and Varnishes: Introduction - Composition of Oil paints - Characteristics of an Ideal Paint - Preparation of Paints - Covering power of paints - Pigment Volume Concentration - Enamels -Distempers - Water Wash and Colour Wash - Varnish - French Polish Wax Polish – Miscellaneous Paints		
UNIT	**TITLE**	**PERIODS**
V	**MODERN MATERIALS**	9
Composite materials – Types – Applications of laminar composites – Fibre textiles– Geomembranes and Geotextiles for earth reinforcement sound insulation materials- thermal insulation materials –fire resistance materials – smart materials		

TOTAL PERIODS:	**45**

TEXT BOOKS:

1.	Duggal.S.K., "Building Materials", 4th Edition, New Age International, 2015.
2.	Gambhir.M.L., "Concrete Technology", 3rd Edition, Tata McGraw Hill Education, 2004.
3	Rajput. R.K., "Engineering Materials", S. Chand and Company Ltd., 2008.
4	Varghese.P.C, "Building Materials", PHI Learning Pvt. Ltd, New Delhi, 2015.

REFERENCE BOOKS:	
1.	Jagadish.K.S, "Alternative Building Materials Technology", New Age International, 2007.
2.	Gambhir. M.L., & Neha Jamwal., "Building Materials, products, properties and systems", Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.
3	IS456 - 2000: Indian Standard specification for plain and reinforced concrete, 2011
4	IS383 - 1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, 2011
5	IS1542-1992: Indian standard specification for sand for plaster, 2009

WEBSITES:	
1.	https://youtu.be/EIDXE28_8eQ (NPTEL - Building Materials & Construction – IIT, Delhi)
2.	https://youtu.be/LYvDoy7MtkE (NPTEL - Construction Materials)

JOURNALS:	
1.	International journal of civil Engineering.(International Journal of Civil Engineering | Home (springer.com)
2.	Construction and building materials(https://www.elsevier.com/journals/construction-and-building-materials/0950-0618)

EXTENSIVE READER:	
1.	

COURSE DESIGNERS			
1.	Dr.S. Lavanya Prabha	Professor & HOD	Civil Engineering
2.	Mr.M.Surendar	Assistant Professor	Civil Engineering

Recommended by Board of Studies	Date: 06-11-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GEB201T	ENVIRONMENTAL SCIENCE FOR COMPUTING SCIENCES (Common to CSE, IT, CS, AIML and AI & DS)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		2	0	0	0	2

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES: NIL

COURSE OBJECTIVES:	
1.	To provide a basic understanding about the Ecology and Environmental agreements.
2.	To explain various natural resources and its conservation.
3.	To apply engineering knowledge to solve environmental pollution and its global issues.
4.	To analyze the concepts of various geospatial technology.
5.	To apply the geospatial technology in environmental aspects.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Analyze various threats to biodiversity, its conservation and environmental agreements.	K4, Analyze
CO2:	Select a suitable method to conserve natural resources for sustainable development.	K4, Analyze
CO3:	Apply necessary steps for pollution prevention, global issues and disaster management.	K3, Apply
CO4:	Analyze the various tools used in the geospatial technology	K4, Analyze
CO5:	Apply the geospatial technology in environmental studies	K3, Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	-	1	-	1	1	-	-	-	-	1
CO2	2	2	-	1	-	1	2	-	1	-	-	1
CO3	2	2	-	1	-	1	1	1	1	-	-	1
CO4	3	2	2	2	2	1	1	-	-	-	-	1
CO5	3	2	2	2	2	1	2	-	-	-	-	1
3 – High : 2 - Medium : 1– Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**Ecological biodiversity and its agreement**	**6**

Definition and scope of an environment – ecosystem (biotic and abiotic components) – ecological succession – food chain, food web – values of biodiversity – threats to biodiversity – conservation of biodiversity: In-situ and Ex-situ.

Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Conference of Parties (COPs, Kyoto Protocol, 1997, Clean Development Mechanism (CDM)

UNIT	**TITLE**	**PERIODS**
II	**Natural resources and its conservation**	**6**

Natural resources – types - Forest resources - Uses and over exploitation - Water Resources – Uses and over utilization - Water conservation- Rain Water Harvesting- Watershed Management – Mineral resources –Uses and Exploitation (Al, Cu, Fe), Food resources- World food problems - Effects of modern agriculture - Role of an individual in conservation of natural resources.

UNIT	**TITLE**	**PERIODS**
III	**Environmental Pollution and Global Issues**	**6**

Environmental pollution- types, causes, effects and controls; Air, water, soil - classification of pollutants based on solubility - hydrophilic, hydrophobicand lipophilic pollutants; Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.

Pollution Tragedies: Love canal, Bhopal Gas, Minamata and Flint water and chernobyl – Disaster management: cyclone and earthquake.

UNIT	**TITLE**	**PERIODS**
IV	**GEOSPATIAL TECHNOLOGY**	**6**

Remote Sensing: Introduction, definition, fundamentals, Sensors, Active and passive remote sensing; data products, remote sensing satellites, Indian remote sensing satellite system (IRS).
GIS: Introduction, components, functions, types of GIS, Data structures in GIS-Raster and Vector data analysis-advantages and disadvantages.

GPS: Introduction, functions and segments of GPS, factors affecting GPS data.

UNIT	TITLE	PERIODS
V	**GEOSPATIAL TECHNOLOGY IN ENVIRONMENTAL STUDIES**	**6**
Application of Geospatial Technology: Watershed studies, Flood studies, Health Issues, Utility studies, Security and Defense studies, Urban and infrastructure development studies, Disaster management.		

TOTAL PERIODS:	30

TEXT BOOKS:	
1.	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2.	Ravikrishnan. A, Environmental Science & Engineering, Sri Krishna Publications, (New Edition).
3.	Joseph G. Fundamentals of remote sensing. Universities Press, Hyderabad.2003.

REFERENCE BOOKS:	
1.	Elliott, D. 1997. Sustainable Technology. Energy, Society and Environment (Chapter 3). New York, Routledge Press.
2.	R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines,Compliances and Standards', Vol. I and II, Enviro Media.
3.	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press 2005.
4.	Lillisand, T. M. and Keifer, R. W. (2007). Remote sensing and image interpretation. John Willey and Sons, USA.
5.	Barrett, E. C. and Curtis, L. F. (1999). Introduction to environmental remote sensing. Chapman and Hall Publishers, USA.

WEBSITES:	
1.	https://www.sciencedirect.com/journal/journal-of-environmental-management
2.	https://journals.e-palli.com/home/index.php/ajgt

JOURNALS:	
1.	Journal of Environmental Management
2.	Environmental Science & Policy.
3.	American Journal of Geospatial Technology

COURSE DESIGNERS			
1.	Dr. C. Ravichandran	Professor and Head	Chemistry
2.	Dr. R. Anitha devi	Assistant Professor	Chemistry
3.	Dr. D. Sivasankaran	Assistant Professor	Chemistry
4.	Dr. K. Saravanan	Associate Professor	Chemistry

Recommended by Board of Studies	Date: 12.10.2023	Syllabus version	1.0
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GEB202T	ENVIRONMENTAL SCIENCE FOR ELECTRONIC SCIENCES (Common to ECE, EEE, RA)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		2	0	0	0	2

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To provide a basic understanding of ecology and its related agreements
2.	To explain importance of natural resources to be conserved
3.	To know about types of pollutants and their Global related issues
4.	To elaborate working of various non-conventional energy generation techniques
5.	To understand the methods of resources recovery from e-wastes

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Analyze the threats to biodiversity for its conservation	K4, Analyze
CO2:	Apply appropriate method to conserve natural resources for environmental sustainability	K3, Apply
CO3:	Analyze global environmental issues caused by pollution and disaster.	K4, Analyze
CO4:	Understand the need of energy conversion of various renewable energy sources and Energy audit	K2, Understand
CO5:	Apply e-waste management techniques and its laws in real time problem	K3, Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	-	1	-	1	1	-	-	-	-	1
CO2	2	2	-	1	-	1	2	-	1	-	-	1
CO3	2	2	-	1	-	1	1	1	1	-	-	1
CO4	3	2	-	1	-	1	3	2	1	-	-	1
CO5	3	2	-	1	-	1	3	2	1	-	-	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**ECOLOGICAL BIODIVERSITY AND ITS AGREEMENT**	6

Definition and scope of an environment – ecosystem (biotic and abiotic components) – ecological succession – food chain, food web – values of biodiversity – threats to biodiversity – conservation of biodiversity: In-situ and Ex-situ.

Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Conference of Parties (COPs, Kyoto Protocol, 1997, Clean Development Mechanism (CDM)

UNIT	**TITLE**	**PERIODS**
II	**NATURAL RESOURCES AND ITS CONSERVATION**	6

Natural resources – types - Forest resources - Uses and over exploitation - Water Resources – Uses and over utilization - Water conservation- Rain Water Harvesting- Watershed Management – Mineral resources –Uses and Exploitation (Al, Cu, Fe), Food resources - World food problems - Effects of modern agriculture - Role of an individual in conservation of natural resources.

UNIT	**TITLE**	**PERIODS**
III	**ENVIRONMENTAL POLLUTION AND GLOBAL ISSUES**	6

Environmental pollution- types, causes, effects and controls; Air, water, soil - classification of pollutants based on solubility - hydrophilic, hydrophobic and lipophilic pollutants; Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture

Pollution Tragedies: Love canal, Bhopal Gas, Minamatta, Flint water and Chernobyl – Disaster management: Cyclone and Earthquake.

UNIT	**TITLE**	**PERIODS**
IV	**RENEWABLE ENERGY AND ENERGY MANAGEMENT AUDIT**	6

Renewable Energy sources - Alternative Energy Sources: Solar energy, Tidal Energy: Energy from the tides- Barrage and Non Barrage Tidal power systems. Wave Energy: Energy from waves - Ocean Thermal Energy Conversion (OTEC) - Bio Energy - Magneto-hydro-dynamic (MHD) energy - Energy Management and audit.

UNIT	TITLE	PERIODS
V	**ELECTRONIC WASTE MANAGEMENT**	6
Introduction –Biodegradable and non-biodegradable waste, Solid waste processing and recovery – Electrical energy generation. Recycling - recovery of materials and direct manufacture of solid waste products - Waste derived fuels (Fuel pellets, Refuse derived fuels) -Waste Management – Swachha Bharat Abhiyan. E-waste: Classification, Methods of handling and disposal - The Solid Waste Management Rules, 2016 - The e-waste (Management) Rules 2016 - The Batteries (Management and Handling) Rules, 2010 with Amendments		

TOTAL PERIODS:	30

TEXT BOOKS:	
1.	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006. (Latest edition)
2.	Ravikrishnan. A, Environmental Science& Engineering, Sri Krishna Publications. (New Edition).
3.	Handbook of Solid Waste Management (McGraw-Hill Handbooks), George Tchobanoglous, Frank Kreith, Publisher: McGraw-Hill Education; 2 edition July, 2002

REFERENCE BOOKS:	
1.	R.K. Trivedi, _Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards Vol. I and II,Enviro Media.
2.	Waste Management and Resource Recovery, Charles R. Rhyner, Leander J.Schwartz, Robert B. Wenger, Mary G. Kohrell, CRC Press Published August 31, 1995.
3.	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press 2005.

WEBSITES:	
1.	https://www.studyiq.com/articles/list-of-environment-conventions-and-protocols/
2.	https://hppcb.nic.in/standards/aqs.pdf
3.	https://beeindia.gov.in/sites/default/files/1Ch3.pdf
4.	https://unctad.org/system/files/official-document/ditcted20031_en.pdf

JOURNALS:	
1.	International Journal of Engineering Research & Technology (IJERT)
2.	Energy Engg. And Management
3.	Energy procedia

COURSE DESIGNERS			
1.	Dr. C. Ravichandran	Professor	Chemistry
2.	Dr. K. Saravanan	Associate Professor	Chemistry
3.	Dr. B. Shanthi	Assistant Professor	Chemistry
4.	Dr. S. Suganya	Assistant Professor	Chemistry

Recommended by Board of Studies	Date: 12.10.2023	Syllabus version	1.0
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GEB203T	ENVIRONMENTAL SCIENCE FOR MECHANICAL SCIENCES (Common to Auto, Civil, Mech)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**2**	**0**	**0**	**0**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To provide a basic understanding of Ecology and its related agreements
2.	To explain natural resources and global environmental issues
3.	To know about pollutant, causes, and their effects in the environment.
4.	To know the concept of sustainability & sustainable development goals
5.	To understand waste recycling

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Analyze the threats to biodiversity for its conservation	K4, Analyze
CO2:	Apply appropriate method to conserve natural resources for sustainable development	K3, Apply
CO3:	Analyze global environmental issues caused by pollution and disaster.	K4, Analyze
CO4:	Understand the concept of environment sustainability	K2, Understand
CO5:	Recover resources from waste	K3, Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	-	1	-	1	1	-	-	-	-	1
CO2	2	2	-	1	-	1	2	-	1	-	-	1
CO3	2	2	-	1	-	1	1	1	1	-	-	1
CO4	1	2	1	-	-	1	1	-	-	1	-	1
CO5	1	2	1	-	1	1	1	-	-	-	1	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	TITLE	PERIODS
I	**ECOLOGICAL BIODIVERSITY AND ITS AGREEMENT**	**6**

Definition and scope of an environment – ecosystem (biotic and abiotic components) – ecological succession – food chain, food web – values of biodiversity – threats to biodiversity – conservation of biodiversity: In-situ and Ex-situ.

Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Conference of Parties (COPs, Kyoto Protocol, 1997, Clean Development Mechanism (CDM)

UNIT	TITLE	PERIODS
II	**NATURAL RESOURCES AND ITS CONSERVATION**	**6**

Natural resources – types - Forest resources - Uses and over exploitation - Water Resources – Uses and over utilization - Water conservation- Rain Water Harvesting- Watershed Management – Mineral resources –Uses and Exploitation (Al, Cu, Fe), Food resources - World food problems - Effects of modern agriculture - Role of an individual in conservation of natural resources.

UNIT	TITLE	PERIODS
III	**ENVIRONMENTAL POLLUTION AND GLOBAL ISSUES**	**6**

Environmental pollution- types, causes, effects and controls; Air, water, soil - classification of pollutants based on solubility - hydrophilic, hydrophobic and lipophilic pollutants; Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture

Pollution Tragedies: Love canal, Bhopal Gas, Minamata and Flint water and chernobyl – Disaster management: cyclone and earthquake.

UNIT	TITLE	PERIODS
IV	**ENVIRONMENTAL STANDARDS AND SUSTAINABILITY**	**6**

Environmental standards - classification, global and Indian environmental standards, ambient air quality standards, Air Act (Prevention and Control of Pollution).

Sustainability - Dimension, concept, aspects of sustainability - from unsustainability to sustainability - Sustainable development goals (SDG): Constraints and barriers for sustainable development.

UNIT	TITLE	PERIODS
V	**RECYCLING OF WASTE MATERIALS**	6
Recycling of spent Lead Acid Battery – End-of-Life Vehicle (ELV) Recycling – Waste engine oil recycling – Solvent Recovery - Barriers for material recycling: social, legal and economic factors - Environmental impacts of waste recycling		

TOTAL PERIODS:	**30**

TEXT BOOKS:	
1.	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2.	Ravikrishnan.A, Environmental Science& Engineering, Sri Krishna Publications. (New Edition)
3.	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press 2005.

REFERENCE BOOKS:	
1.	R.K. Trivedi, Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards ', Vol. I and II, Enviro Media.
2.	Waste Management and Resource Recovery, Charles R. Rhyner, Leander J.Schwartz, Robert B. Wenger, Mary G. Kohrell, CRC Press Published August 31, 1995.

WEBSITES:	
1.	https://link.springer.com/book/10.1007/978-981-10-1866-4
2.	https://hppcb.nic.in/standards/aqs.pdf

JOURNALS:	
1.	Journal of water technology and treatment methods
2.	International Journal of Environmental Science and Technology
3.	Environmental Science and Ecotechnology
4.	Journal of sustainability and environmental management
5.	Journal of material cycles and waste management

EXTENSIVE READER:	
1.	Dharmendra S. Sengar, _Environmental law ', Prentice hall of India PVT LTD,New Delhi, 2007.
2.	Kerry Turner. R, "Sustainable Environmental Management", Principles and Practice Publisher:Belhaven Press,ISBN:1852930039.

COURSE DESIGNERS			
1.	Dr. C. Ravichandran	Professor	Chemistry
2.	Dr. V. Vanitha	Assistant Professor	Chemistry
3.	Dr. R. Boobalan	Assistant Professor	Chemistry
4.	Dr. K. Saravanan	Associate Professor	Chemistry

Recommended by Board of Studies	Date: 12.10.2023	Syllabus version	1.0
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GEB204T	ENVIRONMENTAL SCIENCE FOR BIOMEDICAL ENGINEERS (for Biomedical Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**2**	**0**	**0**	**0**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To provide a basic understanding of Ecology and its related agreements
2.	To explain natural resources and global environmental issues
3.	To know about pollutant, causes, and their effects in the environment.
4.	To gain knowledge about bioremediation methods for protecting the environment.
5.	To impart knowledge about biomedical waste management and its recovery methods.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Analyze the threats to biodiversity for its conservation	K4, Analyze
CO2:	Apply appropriate method to conserve natural resources for sustainable development	K3, Apply
CO3:	Analyze global environmental issues caused by pollution and disaster.	K4, Analyze
CO4:	Identify suitable bioremediation methods for ecological restoration.	K4, Analyze
CO5:	Choose appropriate techniques for biomedical waste treatment and its recovery	K3, Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	-	1	-	1	1	-	-	-	-	1
CO2	2	2	-	1	-	1	2	-	1	-	-	1
CO3	2	2	-	1	-	1	1	1	1	-	-	1
CO4	1	2	1	-	-	1	1	-	-	-	-	1
CO5	1	2	1	-	1	1	1	-	-	-	1	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**ECOLOGICAL BIODIVERSITY AND ITS AGREEMENT**	**6**
Definition and scope of an environment – ecosystem (biotic and abiotic components) – ecological succession – food chain, food web – values of biodiversity – threats to biodiversity – conservation of biodiversity: In-situ and Ex-situ. Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Conference of Parties (COPs, Kyoto Protocol, 1997, Clean Development Mechanism (CDM)		
UNIT	**TITLE**	**PERIODS**
II	**NATURAL RESOURCES AND ITS CONSERVATION**	**6**
Natural resources – types - Forest resources - Uses and over exploitation - Water Resources – Uses and over utilization - Water conservation- Rain Water Harvesting- Watershed Management – Mineral resources –Uses and Exploitation (Al, Cu, Fe), Food resources - World food problems - Effects of modern agriculture - Role of an individual in conservation of natural resources.		
UNIT	**TITLE**	**PERIODS**
III	**ENVIRONMENTAL POLLUTION AND GLOBAL ISSUES**	**6**
Environmental pollution- types, causes, effects and controls; Air, water, soil - classification of pollutants based on solubility - hydrophilic, hydrophobic and lipophilic pollutants ; Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture Pollution Tragedies: Love canal, Bhopal Gas, Minamata, Flint water and Chernobyl – Disaster management: cyclone and earthquake.		
UNIT	**TITLE**	**PERIODS**
IV	**BIOREMEDIATION TECHNIQUES**	**6**
Wastewater treatment – aerobic, anaerobic, methanogenesis. Bioremediation technologies: Biopiles, bioventing, biosparging, pump and treat method, phytoremediation. Advantages and limitations of bioremediation. Biotransformation.		
UNIT	**TITLE**	**PERIODS**
V	**BIOMEDICAL WASTE MANAGEMENT & RESOURCE RECOVERY**	**6**
Biodegradable and Non- Biodegradable Wastes. Biomedical Waste; Generation - Identification and Classification – Storage and Collection - transport. Treatment - Physical and chemical treatment – Thermal treatment. Concept of waste-to-energy (WTE) processes - combustion, pyrolysis, landfill gas (LFG) recovery.		
TOTAL PERIODS:		**30**

TEXT BOOKS:	
1.	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2.	Ravikrishnan. A, Environmental Science & Engineering, Sri Krishna Publications. (New Edition)
3.	Handbook of Solid Waste Management (McGraw-Hill Handbooks), George Tchobanoglous, Frank Kreith, Publisher: McGraw-Hill Education; 2 edition July, 2002

REFERENCE BOOKS:	
1.	Evans, G.G. & Furlong, J. Environmental Biotechnology: Theory and Application (2nd edition). Wiley-Blackwell Publications.2010
2.	Bagchi, A. Design of Landfills and Integrated Solid Waste Management. John Wiley & Sons. 2004
3.	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press 2005.

WEBSITES:	
1.	https://link.springer.com/book/10.1007/978-981-10-1866-4
2.	https://www.mccormick.northwestern.edu/biotechnology/student-research/areas/microbial-environmental-biotechnology.html

JOURNALS:	
1.	Journal of water technology and treatment methods
2.	International Journal of Environmental Science and Technology
3.	Environmental Science and Ecotechnology
4.	Journal of renewable and sustainable energy
5.	Environmental Biotechnology

COURSE DESIGNERS			
1.	Dr. C. Ravichandran	Professor	Chemistry
2.	Dr. B. Shanthi	Assistant Professor	Chemistry
3.	Dr. N.V. Prabhu	Assistant Professor	Chemistry

Recommended by Board of Studies	Date:12.10.2023	Syllabus version	1.0
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES201T	PYTHON PROGRAMMING (Common to Auto, BME, Civil, ECE, EEE, MECH, RA)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**2**	**0**	**0**	**0**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To introduce the basics of algorithmic problem solving
2.	To solve problems using Python conditionals and loops.
3.	To use Python function calls to solve problems.
4.	To impart Python data structures - lists, tuples, dictionaries to represent complex data
5.	To implement file operations using Python.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom"s level
CO1:	Solve problems using algorithms, flowchart and pseudocode.	Analyze
CO2:	Use python conditional and iteration statements for problem solving.	Apply
CO3:	Apply strings and user defined functions in python programming.	Apply
CO4:	Choose appropriate python data structures for real time applications.	Analyze
CO5:	Develop Python code to manipulate data using file and exception-handling.	Create

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	2	1	0	0	0	0	0	2	1	1
CO2	1	2	1	1	0	0	0	0	0	1	0	1
CO3	2	2	1	1	0	0	0	0	0	1	0	1
CO4	2	2	1	1	0	0	0	0	0	1	0	1
CO5	1	3	2	2	0	2	1	0	0	1	1	1
3 — High : 2 - Medium : 1 — Low : „-„ - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**ALGORITHMIC PROBLEM SOLVING**	**5**
Fundamentals of Computing -Algorithms, building blocks of algorithms (statements, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).		
UNIT	**TITLE**	**PERIODS**
II	**CONTROL FLOW STATEMENTS**	**7**
Python interpreter, interactive mode and script mode; variables, expressions, statements; values and data types; Operators and Precedence of operators; Conditionals: conditional, alternative, chained conditional, nested conditional; Iterations: while, for, break, continue.		
UNIT	**TITLE**	**PERIODS**
III	**FUNCTIONS AND STRINGS**	**6**
Function definition and flow of execution, parameters and arguments; Fruitful functions, composition, recursion; Strings: string slices, immutability, Looping and counting, String methods.		
UNIT	**TITLE**	**PERIODS**
IV	**LIST, TUPLE AND DICTIONARIES**	**8**
Lists: list operations: list slices, , traversing, mutability, aliasing, list methods, list arguments, list comprehension; Tuples: Operations, tuple assignment; Dictionaries: Operations, functions and Looping.		
UNIT	**TITLE**	**PERIODS**
V	**FILES, EXCEPTIONS**	**4**
Files: Text files, reading and writing files,; Exceptions: handling exceptions, multiple exception blocks, finally block.		

TOTAL PERIODS:	**30**

TEXT BOOKS:	
1.	ReemaThareja —Python Programming using Problem solving Approachǁ, Oxford University Press.

REFERENCE BOOKS:	
1.	Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter- disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
2.	Paul Gries, Jennifer Campbell and Jason Montojo, Practical Programming: An Introduction to Computer Science using Python 3ǁ, Second edition, Pragmatic Programmers, LLC, 2013.
3.	Allen B. Downey, "Think Python: How to Think Like a Computer Scientist, Version 2.0.17 edition, Updated for Python 3,Shroff/O_ReillyPublishers, (http://greenteapress.com/wp/thinkpython/)

WEBSITES:	
1.	https://www.python.org
2.	https://www.learnpython.org
3.	https://www.w3schools.com/python/

JOURNALS:	
1.	Nil

EXTENSIVE READER:	
1.	Nil

COURSE DESIGNERS			
1.	Dr.N.Ananthi	Professor & Head	Information Technology
2.	Dr.G.S.Anandha Mala	Professor & Head	Computer Science and Engineering
3.	Mrs.B.Chandra	Assistant Professor	Information Technology
4.	Dr.J.Deepa	Associate professor	Computer Science and Engineering
5	A.Jeba Sheela	Assistant Professor	Computer Science and Engineering

Recommended by Board of Studies	Date: 20-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES202T	ENGINEERING MECHANICS FOR BIOMEDICAL ENGINEERS (for Biomedical Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To learn the fundamental principles of mechanics
2.	To understand the effect of force on bodies
3.	To study the geometric dependant properties of solids and orthopaedic mechanics
4.	To know the principles of kinetics and kinematics in dynamics
5.	To familiarize the concept of fluid mechanics and relate it to bio-fluids

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Apply the fundamental principles of mechanics	K3
CO2:	Illustrate the effect of force on bodies	K4
CO3:	Determine the geometric dependant properties of solids and orthopaedic mechanics	K3
CO4:	Infer the principles of kinetics and kinematics in dynamics	K4
CO5:	Analyse the properties of fluids	K4

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	-	-	-	-	-	1	1	-	1
CO2	3	3	2	-	-	-	-	-	1	1	-	1
CO3	3	3	2	-	-	1	-	-	1	1	-	2
CO4	3	3	2	-	-	-	-	-	1	1	-	2
CO5	3	3	2	-	-	1	-	-	1	1	-	2
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**BASICS AND STATICS OF PARTICLES**	**9**

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces –– Vectorial representation of forces – Vector operations of forces - additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility.

UNIT	**TITLE**	**PERIODS**
II	**EQUILIBRIUM OF RIGID BODIES**	**9**

Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.

UNIT	**TITLE**	**PERIODS**
III	**MECHANICS OF SOLIDS AND ORTHOPAEDIC MECHANICS**	**9**

Centre of gravity, Centre of mass and centroid – Moment of inertia of simple and complex areas – Theorems of pappus – Area of moments of inertia of plane areas – parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas - mechanical properties of bone, kinetics and kinematics of joints, Lubrication of joints

UNIT	**TITLE**	**PERIODS**
IV	**DYNAMICS OF PARTICLES**	**9**

Displacements, Velocity and acceleration, their relationship – Relative motion – Newton's laws of motion – Work Energy Equation– Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction.

UNIT	**TITLE**	**PERIODS**
V	**BASICS OF MECHANICS OF FLUIDS**	**9**

Fluids – density – pressure – blood pressure and gravity – buoyancy – moments of force and stability – movement in water –Newton's laws of viscosity – Definitions and simple problems on Newtonian fluid, Non-Newtonian fluid, Navier Stoke's equations, Viscoelasticity, laminar flow, Couette flow, turbulent flow and Hagenpoiseuille equation.

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2.	Dr. R. K. Bansal, A Text Book of Fluid Mechanics, Laxmin Publications (P) Ltd., New Delhi.

REFERENCE BOOKS:	
1.	Vela Murali, "Engineering Mechanics", Oxford University Press (2010).
2.	Frank Bell, "Principles of Mechanics and Biomechanics",Stanley Thorne (Publishers) Ltd., 1998.
3.	Means,L. Thomas and Elaine Langlois. English & Communication for Colleges. Cengage Learning USA: 2007
4.	Lee Waite, "Biofluid Mechanics in Cardiovascular Systems", The McGraw-Hill Companies, 2006.

WEBSITES:	
1.	https://onlinecourses.nptel.ac.in/noc23_bt04/preview
2.	https://onlinecourses.nptel.ac.in/noc21_me130/preview
3.	https://onlinecourses.nptel.ac.in/noc21_me52/preview
4.	https://archive.nptel.ac.in/courses/112/106/112106286/
5.	https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007/

COURSE DESIGNERS			
1.	Mrs.K.Shruthi	Assistant Professor	Biomedical Dept.
2.	Dr. R. Ramadoss	Professor	Mechanical Dept.
3.	Dr.K.G Ashok	Assistant Professor	Mechanical Dept.

Recommended by Board of Studies	Date: 28-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES203T	ENGINEERING MECHANICS FOR CIVIL ENGINEERS (for Civil Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		3	1	0	0	4

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To apply the fundamental concepts in determining the effects of forces on a particle and rigid body.
2.	To determine the geometry dependent properties of solids and sections.
3.	To apply the principles of kinetics and kinematics in dynamics.
4	To understand the concepts of static friction.
5	To know the basics of solid mechanics

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Illustrate the vectorial and scalar representation of forces and moments	Analyze
CO2:	Analyze the rigid body in equilibrium	Analyze
CO3:	Evaluate the properties of surfaces and solids	Analyze
CO4:	Determine the friction and the effects by the laws of friction	Analyze
CO5:	Evaluate the properties of deformable solids	Analyze

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	0	1	0	0	0	0	0	0
CO2	3	3	3	2	0	1	0	0	0	0	0	0
CO3	3	3	3	2	0	1	0	0	0	0	0	0
CO4	3	3	3	2	0	1	0	0	0	0	0	0
CO5	3	3	3	2	0	1	0	0	0	0	0	0
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**STATICS OF PARTICLES**	**PERIODS**
I		**12**
Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces –Vectorial representation of forces – Vector operations of forces - Coplanar Forces – Resolution and Composition of forces – Free body diagram - Forces in space – Equilibrium and equivalent system of forces in space – Principle of transmissibility.		
UNIT	**EQUILIBRIUM OF RIGID BODIES**	**PERIODS**
II		**12**
Free body diagram – Types of supports –reaction forces –stable equilibrium –- Moments and Couples – Vectorial representation of moments and couples – Varignon's theorem – Single equivalent force - Resultant and equilibrium -Equilibrium of Rigid bodies in two and three dimensions - Analysis of truss elements – method of joints.		
UNIT	**PROPERTIES OF SURFACES AND SOLIDS**	**PERIODS**
III		**12**
Centre of gravity, Centre of mass and Centroid – Moment of Inertia of simple and complex areas - Theorems of Pappus - Area moments of inertia of plane areas -Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Radius of gyration – Polar moment of inertia – Product of inertia - Mass moment of Inertia of simple solids.		
UNIT	**DYNAMICS OF PARTICLES AND FRICTION**	**PERIODS**
IV		**12**
Kinematics – Rectilinear and curvilinear motion – projectile motion Kinetics – Newton's second law – D'Alembert's Principle – Work Energy method – Principle of Impulse momentum – Laws of friction – coefficient of friction – Dry friction – wedge friction – ladder friction – rolling resistance		
UNIT	**STRESS, STRAIN AND DEFORMATION OF SOLIDS**	**PERIODS**
V		**12**
Stresses - Strain - - Hooke's law-Relationship among elastic constants- Factor of safety-Thermal stresses- Compound bars- Strain energy due to axial force, impact and suddenly applied load..		

TOTAL PERIODS:	**60**

TEXT BOOKS:	
1.	Beer, F.P and Johnston Jr. E.R., —Vector Mechanics for Engineers (In SI Units): Statics and Dynamics‖, 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2.	Popov, E.P, —Engineering Mechanics of Solids‖, Prentice-Hall of India, New Delhi, (2009).
3	Kazmi, S. M. A., Solid Mechanics, TMH, Delhi, India., 2008.
4	Rajasekaran S and Sankarasubramanian G., —Engineering Mechanics Statics and Dynamics‖, 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

REFERENCE BOOKS:	
1.	Bhavikatti, S.S and Rajashekarappa, K.G., —Engineering Mechanics‖, New Age International (P) Limited Publishers, 2009.
2.	Hibbeller, R.C and Ashok Gupta, —Engineering Mechanics: Statics and Dynamics‖, 11th Edition, Pearson Education 2010.
3	Irving H. Shames and Krishna Mohana Rao. G., —Engineering Mechanics – Statics and Dynamics‖, 4th Edition, Pearson Education 2006

WEBSITES:	
1.	https://www.youtube.com/Statics (NPTEL)
2.	https://youtu.be/nGfVTNfNwnk (NPTEL -IIT Madras – Engineering Mechanics)

JOURNALS:	
1.	Journal of Engineering Mechanics (ASCE)
2.	Journal of Structural Engineering (ASCE)

EXTENSIVE READER:	
1.	

COURSE DESIGNERS			
1.	Dr.S. Lavanya Prabha	Professor & HOD	Civil Engineering
2.	Dr.R.Gopalakrishnan.	Professor	Civil Engineering

Recommended by Board of Studies	Date: 06-11-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES204T	ENGINEERING MECHANICS FOR MECHANICAL SCIENCES (Common to AUTO & MECH)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**1**	**0**	**0**	**4**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To apply the fundamental concepts in determining the effects of forces on a particle and rigid body.
2.	To determine the geometry dependent properties of solids and sections.
3.	To apply the principles of kinetics and kinematics in dynamics.
4	To develop basic dynamics concepts – force, momentum, work and energy
5	To understand the concepts of static friction.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Illustrate the vectorial and scalar representation of forces and moments	Analyze
CO2:	Analyze the rigid body in equilibrium	Analyze
CO3:	Evaluate the properties of surfaces and solids	Analyze
CO4:	Calculate dynamic forces exerted in rigid body	Analyze
CO5:	Determine the friction and the effects by the laws of friction	Analyze

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	0	1	0	0	0	0	0	0
CO2	3	3	3	2	0	1	0	0	0	0	0	0
CO3	3	3	3	2	0	1	0	0	0	0	0	0
CO4	3	3	3	2	0	1	0	0	0	0	0	0
CO5	3	3	3	2	0	1	0	0	0	0	0	0
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**STATICS OF PARTICLES**	**PERIODS**
I		**12**
Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces –Vectorial representation of forces – Vector operations of forces - Coplanar Forces – Resolution and Composition of forces – Free body diagram - Forces in space – Equilibrium and equivalent system of forces in space – Principle of transmissibility.		
UNIT	**EQUILIBRIUM OF RIGID BODIES**	**PERIODS**
II		**12**
Free body diagram – Types of supports –reaction forces –stable equilibrium –- Moments and Couples – Vectorial representation of moments and couples – Varignon's theorem – Single equivalent force - Resultant and equilibrium -Equilibrium of Rigid bodies in two and three dimensions - Analysis of truss elements – method of joints.		
UNIT	**PROPERTIES OF SURFACES AND SOLIDS**	**PERIODS**
III		**12**
Centre of gravity, Centre of mass and Centroid – Moment of Inertia of simple and complex areas - Theorems of Pappus - Area moments of inertia of plane areas -Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Radius of gyration – Polar moment of inertia – Product of inertia - Mass moment of Inertia of simple solids.		
UNIT	**DYNAMICS OF PARTICLES**	**PERIODS**
IV		**12**
Kinematics – Rectilinear and curvilinear motion – Newton 's second law – D'Alembert's Principle – Work Energy method – Principle of Impulse momentum, impact of bodies		
UNIT	**FRICTION**	**PERIODS**
V	The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedge friction, Wheel Friction, Rolling Resistance, Ladder friction.	**12**
TOTAL PERIODS:		**60**

TEXT BOOKS:	
1.	Beer, F.P and Johnston Jr. E.R., —Vector Mechanics for Engineers (In SI Units): Statics and Dynamics‖, 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).
2.	Hibbeller, R.C and Ashok Gupta, —Engineering Mechanics: Statics and Dynamics‖, 11th Edition, Pearson Education 2010.
3	Irving H. Shames and Krishna Mohana Rao. G., —Engineering Mechanics – Statics and Dynamics‖, 4th Edition, Pearson Education 2006
4	Timoshenko S, Young D H, Rao J V and SukumarPati, Engineering Mechanics, 5thEdition, McGraw Hill Higher Education, 2013.

REFERENCE BOOKS:	
1.	Bhavikatti, S.S and Rajashekarappa, K.G., —Engineering Mechanics‖, New Age International (P) Limited Publishers, 2009.
2.	Dr.N.Kottiswaran, Engineering Mechanics, Sri Balaji publications, 2023.
3	Rajasekaran S and Sankarasubramanian G., —Engineering Mechanics Statics and Dynamics‖, 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.

WEBSITES:	
1.	https://www.youtube.com/Statics (NPTEL)
2.	https://youtu.be/nGfVTNfNwnk (NPTEL -IIT Madras – Engineering Mechanics)

JOURNALS:	
1.	Journal of Engineering Mechanics (ASCE)
2.	Journal of Structural Engineering (ASCE)

COURSE DESIGNERS			
1.	Dr.M.Vetrivel Sezhian	Professor & HOD	Mechanical Engineering
2.	Dr.R.Ramadoss	Professor	Mechanical Engineering
3.	Dr.D.Ajith	Associate Professor	Mechanical Engineering
4.	Mr.P.Gopi	Assistant Professor	Automobile Engineering

Recommended by Board of Studies	Date: 16-11-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231CSC201T	PROGRAMMING IN C (Common to B.E Computer Science Engineering, B.Tech Information Technology and B.Tech Artificial Intelligence and Data Science)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	Learn to think logically and write pseudo code or draw flow charts for problems.
2.	Be exposed to the syntax of C.
3.	To develop C Programs using basic programming constructs.
4.	Learn to use arrays and strings in C.
5.	To develop applications in C using functions , pointers and structures
6	To do input/output and file handling in C

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Execute simple programs using basic C programming concepts.	K3
CO2:	Apply arrays and strings for simple application development.	K3
CO3:	Solve complex problems using functions and pointers.	K3
CO4:	Organize heterogeneous data with structures and unions.	K4
CO5:	Select suitable file access techniques for data processing.	K5

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	1	-	1	-	-	2	2	-	3
CO2	3	3	3	1	-	1	-	-	2	2	-	3
CO3	3	3	3	3	-	1	-	-	2	2	-	3
CO4	3	3	3	2	-	1	-	-	2	2	-	3
CO5	3	3	3	2	-	1	-	-	2	2	-	3
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**C PROGRAMMING BASICS**	**9**
Introduction- Algorithm – Flow Charts – Pseudo Code - Structure of a C program – compiling and linking processes – Character set - Constants, Variables – Data Types – Expressions using operators in C – Managing Input and Output operations – Decision Making and Branching – Looping statements.		
UNIT	**TITLE**	**PERIODS**
II	**ARRAYS AND STRINGS**	**9**
Arrays: Initialization – Declaration – Accessing the array elements – Operations on arrays- One dimensional array - two dimensional arrays – Strings: String operations – String Arrays - Simple programs: sorting- searching – matrix operations.		
UNIT	**TITLE**	**PERIODS**
III	**FUNCTIONS AND POINTERS**	**9**
Functions: Introduction - Function prototype - function definition - function call and return statements – Recursive functions. Parameter passing: Pass by value - Pass by reference. Pointers: Pointer operators – Declaring the pointer variable - Pointer arithmetic Null pointer- Arrays and pointers – Array of pointers.		
UNIT	**TITLE**	**PERIODS**
IV	**STRUCTURES AND UNIONS**	**9**
Structures: Introduction - Need for structures –definition and declaration – Structure within structure – Structures and functions – Union: Definition and Declaration – Accessing the members of union - Programs using Structures and Unions – Scope of variables - Storage classes - Preprocessor directives.		
UNIT	**TITLE**	**PERIODS**
V	**FILE HANDLING**	**9**
Introduction – Using files in C - File operation: Read data from files, writing data to files, detecting the end of file, Functions for selecting a record randomly – File pointer – Error handling - Types of file processing: Sequential access, Random access- Dynamic memory allocation.		
TOTAL PERIODS:		**45**

TEXT BOOKS:	
1.	Balagurusamy E — Programming in ANSI C, McGraw Hill Publication, Eighth Edition, 2019.
2.	Herbert Schildt — The Complete Reference C, McGraw Hill Education, Fourth Edition , 2017
3.	Reema Thareja, —Programming in C, Oxford University Press, Second Edition, 2016.

REFERENCE BOOKS:	
1.	Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C", McGraw-Hill Education, 1996.
2.	Pradip Dey, Manas Ghosh, —Fundamentals of Computing and Programming in C, First Edition, Oxford University Press, 2009.
3.	Paul Deitel and Harvey Deitel, —C How to Program, Seventh edition, Pearson Publication
4.	Juneja, B. L and Anita Seth, —Programming in C, CENGAGE Learning India pvt. Ltd., 2011.
5.	Kernighan, B.W and Ritchie, D.M, —The C Programming language, Second Edition, Pearson Education, 2006.

WEBSITES:	
1.	www.w3schools.com/c
2.	https://www.programiz.com/c-programming

JOURNALS:	
1.	Nil

EXTENSIVE READER:	
1.	Nil

COURSE DESIGNERS			
1.	Dr G S Anandha Mala	Professor	Computer Science and Engineering
2.	Dr S Ahamed Ali	Assistant Professor	Computer Science and Engineering
3.	Dr A Arockia Abins	Assistant Professor	Computer Science and Engineering
4.	Dr J Deepa	Associate Professor	Computer Science and Engineering
5	Dr V Balaji	Associate Professor	CSE (Cyber Security)

Recommended by Board of Studies	Date: 20-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231BMC201T	FUNDAMENTALS OF BIOCHEMISTRY (for Biomedical Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To study the basic concepts of biochemistry
2.	To get a clear idea of carbohydrates and its cycle
3.	To know the significance of lipids and saponification process
4.	To understand the metabolic pathways in normal and pathological conditions.
5.	To be familiar with the types of enzymes

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Describe the surface properties involved in biological systems	K1
CO2:	Understand the basic units of large molecules	K2
CO3:	Illustrate the functions of bio molecules	K3
CO4:	Categorize the structure of amino acids and proteins.	K4
CO5:	Summarize the clinical importance of enzymes and organ function tests.	K5

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	2	3	2	1	1	2	1	-	-
CO2	3	2	1	2	3	2	1	1	2	1	-	-
CO3	3	2	1	2	3	2	1	1	2	1	-	-
CO4	3	2	1	2	3	2	1	1	2	1	-	-
CO5	3	2	1	2	3	2	1	1	2	1	-	-
CO6												
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**INTRODUCTION TO BIOCHEMISTRY**	**9**
Introduction to Biochemistry, water as a biological solvent, weak acid and bases, pH, buffers, Handerson - Hassel Balch equation, physiological buffers, fitness of the aqueous environment for living organism. Principle of viscosity, surface tension, adsorption, diffusion, osmosis and their applications in biological systems.		
UNIT	**TITLE**	**PERIODS**
II	**CARBOHYDRATES AND VITAMINS**	**9**
Classification of carbohydrates- Isomerism, racemization and mutarotation. Structure, physical and chemical properties of carbohydrates. Metabolic pathways and bioenergetics – Glycolysis, glycogenesis, glycogenolysis and its hormonal regulation. TCA cycle and electron transport chain. Oxidative phosphorylation. Classification of vitamin. Diseases due to deficiency of water soluble and fat soluble vitamins. Clinical importance of vitamins.		
UNIT	**TITLE**	**PERIODS**
III	**LIPIDS**	**9**
Classification of lipids- simple, compound and derived lipids. Nomenclature of fatty acid, physical and chemical properties of fat. Saponification number, Reichert- Meissl number and iodine number. Metabolic pathways: synthesis and degradation of fatty acid (beta oxidation), hormonal regulation of fatty acid metabolism, ketogenesis, structural architecture and significance of biological membrane. Structure of steroid nucleus. Biological role of cholesterol.		
UNIT	**TITLE**	**PERIODS**
IV	**NUCLEIC ACID & PROTEIN**	**9**
Structure of purines and pyrimidines, nucleoside, nucleotide, DNA act as a genetic material, chargaffs rule. Watson and crick model of DNA. Structure of RNA and its type. Classification, structure and properties of proteins, structural organization of proteins, classification and properties of amino acids. Separation of protein: gel filtration, electrophoresis and ultracentrifugation.		

UNIT	TITLE	PERIODS
V	ENZYMES AND HORMONES	9
Classification of enzymes- Kinetics of enzymes - Michaelis - Menten equation. Factors affecting enzymatic activity: temperature, pH, substrate concentration and enzyme concentration. Inhibitors of enzyme action: Competitive, non- competitive, irreversible. Enzyme: Mode of action, allosteric and covalent regulation. Classification of hormones. Characteristics of hormones.		
TOTAL PERIODS:		**45**

TEXT BOOKS:	
1.	David L. Nelson, Michael M.Cox, Lehninger "Principles of Biochemistry Macmillan", 6th Edition 2013.
2.	Keith Wilson and John Walker, "Practical Biochemistry– Principles &Techniques", Oxford University press, 7th Edition, 2010.

REFERENCE BOOKS:	
1.	Pamela. C. Champe and Richard. A. Harvey, "Biochemistry Lippincott's Illustrated Reviews. Lippincott" Raven publishers, 6th Edition, 2013.
2.	Trevorpalmer, "Understanding Enzymes", Ellis Horwood LTD, 4th Edition, 1995.

WEBSITES:	
1.	https://www.amazon.in/Lehninger-Principles-Biochemistry-David-Nelson/dp/1464109621
2.	https://www.amazon.in/Practical-Biochemistry-Principles-John-Walker/dp/0521799651
3.	https://books.google.com/books/about/Biochemistry.html?id=M_YOW50cg9C
4.	https://onlinelibrary.wiley.com/doi/abs/10.1002/jctb

JOURNALS:	
1.	Journal of cellular Biochemistry, ' https://onlinelibrary.wiley.com/journal/10974644'

EXTENSIVE READER:	
1.	Sankhavaram. R Panini, Medical Biochemistry - An Essential Textbook, Thieme,, ISBN:9781626237445

COURSE DESIGNERS			
1.	Dr.G.Babu	Professor & Head	Biomedical Engineering
2.	Dr.K.Yamuna Devi	Assistant Professor	Biomedical Engineering
3.	Dr.B.Suresh Chander Kapali	Assistant Professor	Biomedical Engineering
4.	Ms.K.Shruthi	Assistant Professor	Biomedical Engineering

Recommended by Board of Studies	Date: 28.10.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231ECC201T	ELECTRIC CIRCUITS AND ELECTRONIC DEVICES (for Electronics and Communication Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**1**	**0**	**0**	**4**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To get familiarized with basic circuit analysis.
2.	To apply network reduction techniques in circuits.
3.	To perform transient analysis in RL, RC, RLC circuits.
4.	To learn the operation and features of semiconductor diodes and transistors.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Compute the voltage and current in electric circuits by using mesh and nodal analysis method.	K3
CO2:	Apply the network reduction theorems in circuit analysis.	K3
CO3:	Calculate the transient response of RL,RC and RLC circuits using laplace transform.	K3
CO4:	Determine the resonant frequency, Quality factor and bandwidth of series and parallel RLC circuits.	K3
CO5:	Explain the operation and characteristics of diodes and transistors.	K3

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	1	2	-	-	-	2	-	-	2
CO2	3	2	2	1	2	-	-	-	2	-	-	2
CO3	3	2	2	1	2	-	-	-	2	-	-	2
CO4	3	2	2	1	2	2	1	-	2	-	-	2
CO5	3	2	2	1	1	1	-	-	2	-	-	2
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**BASIC CIRCUIT ANALYSIS**	**PERIODS**
I		**12**

Introduction to D.C and A.C circuit components – Classification of circuit elements –Types of sources – Source transformation –Series and parallel connection –Star-delta conversion–Kirchhoff's laws– Mesh current analysis for D.C and A.C circuits – Nodal voltage analysis for D.C and A.C circuits.

UNIT	**NETWORK REDUCTION THEOREMS**	**PERIODS**
II		**12**

Source transformation – Voltage division and Current division method – Superposition theorem – Thevenin's theorem – Norton's theorem – Maximum power transfer theorem – Reciprocity theorem.

UNIT	**TRANSIENT ANALYSIS AND RESONANCE**	**PERIODS**
III		**12**

Transient response of RL, RC and RLC circuits to excitation by Step Signal, Sinusoidal signal and exponential sources using Laplace transform. Series and parallel resonances – Bandwidth – Q factor – Selectivity.

UNIT	**SEMICONDUCTOR DIODES**	**PERIODS**
IV		**12**

PN junction diode, Current equations, Energy Band diagram – Diffusion and drift current densities, Transition and Diffusion Capacitances – Switching Characteristics – Zener diode and its characteristics – Avalanche and Zener Breakdown mechanisms – Tunnel diode – Varactor diode – SCR.

UNIT	**TRANSISTORS**	**PERIODS**
V		**12**

Principle and operation of PNP and NPN transistors – Current equations – Input and Output characteristics of CE, CB, CC configurations – JFETs – Drain and Transfer characteristics – MOSFET – Enhancement and depletion types - Characteristics – Comparison of BJT with JFET – Comparison of JFET with MOSFET– Metal-Semiconductor Junction MESFET– Dual gate MOSFET–UJT.

TOTAL PERIODS:	**60**

TEXT BOOKS:	
1.	William H. Hayt, Jr. Jack E. Kemmerly and Steven M. Durbin, Engineering Circuit Analysis, McGraw Hill Science Engineering, Eighth Edition, 11th Reprint 2016.
2.	Robert Boylestad and Louis Nashelsky, Electron Devices and Circuit Theory, Pearson Prentice Hall, 10th edition, 2008.

REFERENCE BOOKS:	
1.	Donald A Neaman, Semiconductor Physics and Devices‖, Fourth Edition, Tata Mc GrawHill Inc. 2012.
2.	Joseph Edminister and Mahmood Nahvi, Electric Circuits‖, Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.
3.	Charles K. Alexander, Mathew N.O. Sadiku, Fundamentals of Electric Circuits, Fifth Edition, McGraw Hill, 9th Reprint 2015.
4.	R.S.Sedha, — A Text Book of Applied Electronics‖ S.Chand Publications, 2006.
5.	Salivahanan. S, Suresh Kumar. N, Vallavaraj.A, Electronic Devices and Circuits, Third Edition, Tata McGraw- Hill, 2008.

WEBSITES:	
1.	https://nptel.ac.in/courses/117106108/
2.	https://nptel.ac.in/courses/117103063/

JOURNALS:	
1.	Journal of semiconductors, https://iopscience.iop.org/journal/1674-4926
2.	International journal of circuit theory and applications, https://onlinelibrary.wiley.com/journal/1097007X

EXTENSIVE READER:	
1.	

COURSE DESIGNERS			
1.	Dr.M.Devaraju	Professor and Head	Department of ECE
2.	Dr.D.C.Diana	Associate Professor	Department of ECE
3.	Ms.S.Suruthi	Assistant Professor	Department of ECE

Recommended by Board of Studies	Date: 28.10.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231EEC201T	ELECTRIC CIRCUIT ANALYSIS (foe Electrical and Electronics Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**-**	**-**	**-**	**3**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To introduce electric circuits and its analysis
2.	To impart knowledge on solving circuits using network theorems
3.	To introduce the phenomenon of resonance in coupled circuits.
4.	To educate on obtaining the transient response of circuits.
5.	To illustrate the phasor diagrams and analyse the three phase circuits

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Analyze electrical circuits using Ohm's law and Kirchhoff's law	Analyze
CO2:	Apply circuit theorems to reduce any complex circuits.	Apply
CO3:	Solve the series and parallel resonance circuits	Apply
CO4:	Examine the transient behaviour of electrical circuits.	Apply
CO5:	Analyze the three phase circuits	Analyze

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	2	1	-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	1	-	-	-	-	1
CO3	3	3	2	2	2	-	1	-	-	-	-	1
CO4	3	2	2	2	2	-	-	-	-	-	-	-
CO5	3	3	2	2	1	-	1	-	-	-	-	-
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**FUNDAMENTALS IN ELECTRICITY AND BASIC CIRCUITS ANALYSIS**	**9**
Electrical Quantities—Charge- Electric Potential, Voltage, Current, Power, Energy, DC, AC, time period, Frequency, Phase, Flux density, RMS, Average, and Peak values of AC- Ohm's Law – Kirchhoff's laws – DC and AC Circuits – Resistors, Inductors and Capacitors in series and parallel circuits - Mesh and node analysis – Phasor Diagram –Power, Power Factor and Energy.		
UNIT	**TITLE**	**PERIODS**
II	**NETWORK TOPOLOGY, REDUCTION AND THEOREMS**	**9**
Network reduction: voltage and current division, source transformation – star delta conversion. Thevenin's and Norton's Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem. – Characterization of two port networks in terms of Z, Y and h parameters.		
UNIT	**TITLE**	**PERIODS**
III	**RESONANCE AND COUPLED CIRCUITS**	**9**
Series and parallel resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Coupled circuits – Single tuned circuits.		
UNIT	**TITLE**	**PERIODS**
IV	**TRANSIENT RESPONSE ANALYSIS**	**9**
L and C elements- Phasor representation of Purely Resistive(R), Purely Inductive(L), Purely Capacitive (C) - RL, RC, RLC circuits -Transient response of RL, RC and RLC Circuits using Laplace transform with DC input and A.C. excitations.		
UNIT	**TITLE**	**PERIODS**
V	**THREE PHASE CIRCUITS**	**9**
Three phase balanced / unbalanced voltage sources – analysis of three phase balanced & Un balanced 3-wire and 4-wire Circuits with star and delta connected loads – Phasor diagram of voltage and current - Power and power factor measurements in three phase circuits- Harmonics and filters.		
TOTAL PERIODS:		**45**

TEXT BOOKS:	
1.	Carlson and Gisser, “Electrical engineering concepts and applications”, Addison Wesley, 1990
2.	David V. Kerns Jr., J. David Irwin, “Essentials of Electrical and Computer Engineering”, Pearson publications, 2004
3.	Sudhakar A, Shyammohan S. Palli, Circuits and Networks: Analysis and Synthesis, 5th ed., McGraw Hill Education l, 2017
4.	William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, “Engineering Circuits Analysis”, Tata McGraw Hill publishers, 8thedition, New Delhi, 2013.

REFERENCE BOOKS:	
1.	Chakrabati A, “Circuits Theory (Analysis and synthesis), Dhanpath Rai& Sons, New Delhi, 1999.
2.	Charles K. Alexander, Mathew N.O. Sadiku, “Fundamentals of Electric Circuits”, 6th Edition, McGraw Hill, 2003.
3.	M Nahvi, Joseph Edminister and K Uma Rao, “Electric circuits”, (Schaum’s outline series), Tata McGraw-Hill publishers, 5th edition, New Delhi, 2010.

COURSE DESIGNERS			
1.	Dr.P.Marish Kumar	Asso.Prof.	EEE
2.	Mrs.J.Lydia	Asst.Prof.	EEE

Recommended by Board of Studies	Date: 30.10.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231ROC201T	BASIC MECHANICS FOR ROBOTICS (for Robotics and Automation)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**1**	**0**	**0**	**4**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	40 %	60 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To impart knowledge on the force analysis in statics and equilibrium of rigid bodies.
2.	To pass on knowledge of the vectorial representation of forces and moments in order to solve forces in space.
3.	To impart the knowledge of the geometry dependent properties of solids and sections.
4.	To impart the knowledge of dynamics of particles and various types of frictions.
5.	To pass on the principles of formation of mechanisms and kinematics, gears and gear trains.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		**Bloom's level**
CO1:	determine the magnitude and position of resultant force for coplanar force system and equilibrium of a system by using the concept of resolution of forces and moments.	Apply
CO2:	evaluate the resultant force, moment and equilibrium of rigid bodies in space using vector approach.	Apply
CO3:	determine the centroid, moment of inertia, principal moment of inertia for plane areas and centre of gravity, mass moment of inertia for solid figures.	Apply
CO4:	evaluate the dynamic forces exerted in the rigid bodies and estimate the amount of friction by using the law of friction.	Apply
CO5:	determine the velocities, acceleration of various mechanisms and properties of gears and gear trains	Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	1	-	-	-	-	-	-	-	-
CO2	3	3	-	1	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	1	1	-	-	-	-	-	-	-	-
CO5	3	3	2	1	-	-	-	-	-	-	-	-
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**STATICS OF PARTICLES AND RIGID BODIES**	**12**
Introduction – Laws of Mechanics – Lami's theorem, Parallelogram, and triangular Law of forces –- Coplanar Forces – Resolution and Composition of forces – Free body diagram – Principle of transmissibility. Types of supports – reaction forces – stable equilibrium –- Moments and Couples - Varignon's theorem		
UNIT	**TITLE**	**PERIODS**
II	**VECTORIAL REPRESENTATION**	**12**
Vectorial representation of forces – Vector operations of forces - Forces in space – Equilibrium and equivalent system of forces in space - Equilibrium of Rigid bodies in two and three dimensions		
UNIT	**TITLE**	**PERIODS**
III	**PROPERTIES OF SURFACES AND SOLIDS**	**12**
Centroid and Centre of gravity – Moment of Inertia of simple and complex areas -Theorems of Pappus - Area moments of inertia of plane areas -Parallel axis theorem and perpendicular axis theorem – Principal moments of inertia of plane areas – Radius of gyration – Polar moment of inertia – Product of inertia - Mass moment of Inertia of simple solids		
UNIT	**TITLE**	**PERIODS**
IV	**DYNAMICS OF PARTICLES AND FRICTION**	**12**
Kinematics - Rectilinear and Curvilinear Motion of Particles – Kinetics – Newton's second law, work – energy method, impulse – momentum method - The Laws of Dry Friction, Coefficients of Friction, Angles of Friction, Wedge friction, Wheel Friction, Rolling Resistance, Ladder friction.		
UNIT	**TITLE**	**PERIODS**
V	**KINEMATICS OF MACHINES AND GEAR TRAINS**	**12**
Mechanisms – Terminology and definitions – kinematics inversions of 4 bar and slide crank chain – kinematics analysis in simple mechanisms – velocity and acceleration polygons. Spur gear – law of toothed gearing – involute gearing – Interchangeable gears – Gear tooth action interference and undercutting – nonstandard teeth – gear trains – parallel axis gears trains – epicyclic gear trains.		
TOTAL PERIODS:		**60**

TEXT BOOKS:	
1.	Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, Sanjeev Sanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 12thEdition, 2019
2.	Vela Murali, “Engineering Mechanics-Statics and Dynamics”, Oxford University Press, 2018.
3.	Khurmi, R.S.,” Theory of Machines”, 14th Edition, S Chand Publications, 2020.

REFERENCE BOOKS:	
1.	Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 14th edition, Prentice Hall, 2019.
2.	Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
3.	Timoshenko S, Young D H, Rao J V and SukumarPati, Engineering Mechanics, 5thEdition, McGraw Hill Higher Education, 2017.
4.	Ghosh. A and Mallick, A.K., “Theory of Mechanisms and Machines", 3rd Edition Affiliated East-West Pvt. Ltd., New Delhi, 2008

WEBSITES:	
1.	https://archive.nptel.ac.in/courses/112/106/112106180/
2.	https://nptel.ac.in/courses/112103109
3.	https://archive.nptel.ac.in/courses/112/104/112104121/

JOURNALS:	
1.	Journal of Engineering Mechanics
2.	Mechanism and Machine Theory

COURSE DESIGNERS			
1.	Dr. V. Elango	Professor & Head	Robotics and Automation Dept.
2.	Dr. M. Madhan	Assistant Professor	Robotics and Automation Dept.
3.	Dr. S. Santhosh	Assistant Professor	Robotics and Automation Dept.

Recommended by Board of Studies	Date: 16.11.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231BTC201T	MATERIALS SCIENCE FOR BIOTECHNOLOGISTS	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION					
Duration of End Semester Examination in Hours	Marks			Minimum marks for Pass	
	Continuous assessment Examination	End Semester Examination	Maximum marks	End Semester Examination	Total
3	40	60	100	45	50

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To make the students effectively to understand the basics of crystallography and crystalimperfections.
2.	To enable the students to get knowledge on various strengthening methods of materials, andalso various mechanical properties and their measurement.
3.	To impart knowledge on the basics of phase diagrams and their applications.
4.	To learn about iron-carbon system, and about various ferrous and non-ferrous alloys.
5.	To introduce different types of bio materials and their applications.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Understand and analyze the basics of crystallography and its importance in materials properties	K4, Analyze
CO2:	understand and use the significance of dislocations, strengthening mechanisms, and tensile, creep,hardness and fracture behavior of materials	K3, Apply
CO3:	gain knowledge on binary phase diagrams, and also will be able to determine the phasecomposition and phase amount.	K3, Apply

CO4:	Enumerate the Fe-C system and various micro structures in it, and also about variousferrous and non-ferrous alloys.	K5 Evaluate
CO5:	get adequate develop on metallic, ceramic and polymeric bio materials and their applications.	K6 Create

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)

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

3 – High : 2 - Medium : 1 – Low : '-' - No correlation

UNIT	TITLE	PERIODS
I	**CRYSTALLOGRAPHY**	**9**

Crystallographic directions and planes – metallic crystal structures: BCC, FCC and HCP – linearand planar densities – crystal imperfections- edge and screw dislocations, Burgers vector and elastic strain energy- surface imperfections – grain and twin boundaries – Polymorphism – phasechanges – nucleation and growth – homogeneous and heterogeneous nucleation

UNIT	TITLE	PERIODS
II	**MECHANICAL PROPERTIES**	**9**

Tensile test - plastic deformation by slip – slip systems – mechanisms of strengthening in metals: strain hardening, grain size reduction, solid solution strengthening, precipitation hardening — Creep: creep curves,stress and temperature effects, mechanisms of creep, creep-resistant materials — Fracture: ductile and brittle fractures - the Griffith criterion –fracture toughness - Fatigue failure:the S-N curve — factors that affect fatigue life — Hardness: Rockwell and Brinell hardness tests, Knoop and Vickers microhardness tests

UNIT	TITLE	PERIODS
III	**PHASE DIAGRAMS**	**9**

Basic concepts - Gibbs phase rule –Unary phase diagram (iron) - Binary phase diagrams: isomorphous systems (Cu-Ni) –determination of phase composition and phase amounts – tielineand lever rule - binary eutectic diagram with no solid solution and limited solid solution (Pb-Sn) —eutectoid and peritectic reactions - other invariant reactions – microstructural development during the slow cooling: eutectic, hypereutectic and hypoeutectic compositions.

UNIT	TITLE	PERIODS
IV	**FERROUS AND NONFERROUS ALLOYS**	9
The Fe-Fe_3C phase diagram: phases, invariant reactions,development of microstructure in eutectoid, hypoeutectoid and hypereutectoid alloys–influence of other alloying elements in the Fe-C system - phase transformations –isothermal transformation diagram for eutectoid iron-carbonalloy – microstructures: pearlite, bainite, spheroidite and martensite – steels, stainless steels andcast irons – copper alloys – aluminum alloys – titanium alloys.		
UNIT	**TITLE**	**PERIODS**
V	**MATERIALS FOR BIOLOGICAL APPLICATIONS**	**9**
Biocompatibility – host response – materials response – Metallic implants: Titanium and its alloys, stainless steel – Cobalt-Chromium alloys – Tantalum – Nitinol – magnesium based biodegradable alloys. Bioceramics: Alumina, Zirconia, hydroxyapatite, tricalcium phosphate, bioactive glasses, pyrolytic carbon, graphite, graphene. Polymeric implant materials: Polyethylene, polypropylene, polyacrylates – soft and hard tissue replacement materials.		

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	R.Balasubramaniam, Callister's Materials Science and Engineering.Wiley (Indian Edition),2014.
2.	V.Raghavan. Materials Science and Engineering: A First Course, Prentice Hall IndiaLearning Private Limited, 2015.
3.	Joon Park and R.S.Lakes, Biomaterials: An Introduction, Springer, 2007.

REFERENCE BOOKS:	
1.	J.F.Shackelford. Introduction to Materials Science for Engineers. Pearson,2015
2.	Wendelin Wright and Donald Askeland , Essentials of Materials Science and Engineering,CL Engineering, 2013.
3.	J.C. Anderson, K.D. Leaver, P. Leevers and R.D. Rawlings, Materials Science for Engineers, CRC Press, 2003.

WEBSITES:	
1.	https://www.sciencelearn.org.nz/topics/biotechnology
2.	https://www.btci.org/k-12-programs/resources-for-biotechnology-education/

JOURNALS:	
1.	https://biotechsustainablematerials.biomedcentral.com/
2.	https://www.worldscientific.com/worldscinet/ijcmse
3.	https://www.mdpi.com/journal/ijms/sections/material_sciences
4.	https://crimsonpublishers.com/rdms/
5.	https://www.asjp.cerist.dz/en/PresentationRevue/660

EXTENSIVE READER:	
1.	Jean P.Mercier, G.Zambelli and W.Kurz, Introduction to Materials Science,Elsevier, 2002.
2.	Sujata V.Bhat , Biomaterials, Narosa Publishers, 2002.

COURSE DESIGNERS			
1.	Dr. G. Babu	HOD	Department of Biomedical Engineering
2.	Dr. K. Yamuna Devi	Assistant Professor	Department of Biomedical Engineering
3.	Dr. M. Neela Harish	Assistant Professor	Department of Biomedical Engineering
4.	Dr. S. Sathish	Assistant Professor	Department of Biomedical Engineering
5.	Mrs. B. Lakshmi Shree	Assistant Professor	Department of Biomedical Engineering

Recommended by Board of Studies	Date: 11.05.2024	Syllabus version	1
Approved by the Academic Council	Date:	Meeting No.	1

231BTC202T	BIOORGANIC CHEMISTRY	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**3**	**0**	**0**	**0**	**3**

SCHEME OF EXAMINATION					
Duration of End Semester Examination in Hours	Marks			Minimum marks for Pass	
	Continuous assessment Examination	End Semester Examination	Maximum marks	End Semester Examination	Total
3	40	60	100	45	50

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To enable the students to understand the basics concepts of chemical reactions
2.	To make students understand the kinetics and its reaction mechanism
3.	To understand about the modern techniques of kinetic and thermodynamic methods
4.	To study of Enzyme selectivity and its catalytic property in various organic synthetic reactions.
5.	To apply modern organic techniques of bioorganic reactions and various biosynthesis methods .

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	describe the basic elements of protein structure, the DNA double helix, and RNA structures.	K4, Analyze
CO2:	describe the basic chemical and structural elements of replication, transcription, and translation.	K3, Apply
CO3:	outline the basic metabolic pathways for glucose metabolism, amino acid biosynthesis and breakdown, fatty acid production and breakdown.	K3, Apply
CO4:	describe fundamental chemical mechanisms for each of the major types of chemical reactions observed in biochemistry,	K3, Apply
CO5:	develop various biochemical reactions and biosynthesis techniques	K6, Create

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	1	-	-	-	1	-	-	-	1	1
CO2	3	2	1	-	-	-	1	-	-	-	1	1
CO3	3	2	1	-	-	-	1	-	-	-	1	1
CO4	3	2	1	-	-	-	1	-	-	-	1	1
CO5	3	2	1	-	-	-	1	-	-	-	1	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	**TITLE**	**PERIODS**
I	**BONDING AND STEREOCHEMISTRY**	**9**
Atoms Electrons and orbitals - Covalent Bonds - Octet rule - Polar covalent Bonds - Electronegativity- formal charge - Resonance Acids and Bases - Arrhenius and Bronsted Lowry Theories - Acid Base equilibria - SP3 hybridization – Conformation analysis ethane, butane and cyclohexane - Cis- trans isomerism. Stereochemical activity around the tetrahedral carbon — optical activity - Conformation of the peptide bond.		
UNIT	**TITLE**	**PERIODS**
II	**MECHANISMS OF SUBSTITUTION AND ADDITION REACTIONS**	**9**
SN1 and SN2 reactions on tetrahedral carbon- nucleophiles- mechanism steric effects — nucleophilic addition on Acetals and ketals -Aldehyde and ketone groups – reactions of carbonyl group with amines- acid catalyzed ester hydrolysis — Saponification of an ester- hydrolysis of amides. Ester enolates - claisen condensation – Michael condensation.		
UNIT	**TITLE**	**PERIODS**
III	**KINETICS AND MECHANISM**	**9**
Kinetic method – Rate law and mechanism – Transition states- Intermediates – Trapping of intermediates – Microscopic reversibility – Kinetic and thermodynamic reversibility – Isotopes for detecting intermediates. Primary and secondary isotopes – the Arrhenius equation Eyring equation - ΔG, ΔS, ΔH, Thermodynamics of coupled reactions.		
UNIT	**TITLE**	**PERIODS**
IV	**CATALYSIS**	**9**
Reactivity – Coenzymes – Proton transfer – metal ions – Intra molecular reactions – Covalent catalysis – Catalysis by organized aggregates and phases. Inclusion complexation		
UNIT	**TITLE**	**PERIODS**
V	**BIOORGANIC REACTIONS**	**9**
Timing of Bond formation and fission – Acyl group transfer – C-C bond formation and fission – Catalysis of proton transfer reactions – Transfer of hydride ion – Alkyl group. Transfer – Terpene biosynthesis — Merrifield state peptide synthesis — Sanger method for peptide and DNA sequencing		

TOTAL PERIODS:	**45**

TEXT BOOKS:	
1.	Carey, Francis A.” Organic Chemistry”. VIIth Edition, Tata McGraw Hill, 2009.
2.	Page, M.I. and Andrew Williams “Organic and Bio-organic Mechanisms”. Pearson, 2010
3.	The Organic Chemistry of Biological Pathways, Authors: John E. McMurry and Tadhg P. Begley Publisher: Roberts and Company Publishers, Englewood, CO

REFERENCE BOOKS:	
1.	Dugas, Hermann “Bioorganic Chemistry: A Chemical Approach to Enzyme Action” 3rd Edition, Springer, 2003

WEBSITES:	
1.	https://www.khanacademy.org/science/organic-chemistry
2.	https://www.organic-chemistry.org/

JOURNALS:	
1.	https://www.sciencedirect.com/journal/bioorganic-chemistry
2.	https://pubs.acs.org/doi/abs/10.1021/jo900183c
3.	https://www.taylorfrancis.com/books/mono/10.1201/9780203381090/introduction-bioorganic-chemistry-chemical-biology-gregory-weiss-david-van-vranken
4.	https://www.tandfonline.com/doi/full/10.1080/13102818.2020.1731333
5.	https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/cmdc.201700157

EXTENSIVE READER:	
1.	Highlights in Bioorganic Chemistry, Carsten Schmuck, Helma Wennemers , Hardcover, 600 Pages, First Edition, March 2004
2.	Advanced Organic Chemistry, Francis A. Carey, Richard A. Sundberg, Paperback, 1199 Pages 5th Edition, 2007, ISBN-13: 978-0-387-44897-8

COURSE DESIGNERS			
1.	Dr. G. Babu	HOD	Department of Biomedical Engineering
2.	Dr. K. Yamuna Devi	Assistant Professor	Department of Biomedical Engineering

3.	Dr. S. Sathish	Assistant Professor	Department of Biomedical Engineering
4.	Mrs. B. Lakshmi Shree	Assistant Professor	Department of Biomedical Engineering

Recommended by Board of Studies	Date: 11.05.2024	Syllabus version	1
Approved by the Academic Council	Date:	Meeting No.	1

231GES211L	PROGRAMMING LABORATORY THROUGH PYTHON (Common to Auto, BME, Civil, ECE, EEE, MECH, RA)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**3**	**1**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

COURSE OBJECTIVES:	
1.	To impart knowledge on problem solving approaches.
2.	To experiment with programming constructs in Python
3.	To practice various computing strategies for Python-based solutions to real world problems
4.	To use Python data structures - lists, tuples, dictionaries.
5.	To train inbuilding simple project using python.

COURSE OUTCOMES:		Bloom"s level
Upon completion of this course, student will be able to:		Analyze
CO1:	Develop algorithmic solutions to simple computational problems	Apply
CO2:	Implement programs in Python using conditionals and loops for solving problems	Apply
CO3:	Deploy functions to decompose a Python program	Apply
CO4:	Process compound data using Python data structures.	Apply
CO5:	Design python programs for file handling and exception handling.	Apply
CO6:	Create GUI application for user defined requirement.	Create

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	2	2	1	1	-	-	-	-	2	1	2
CO2	1	2	1	1	1	-	-	-	1	2	1	2
CO3	2	2	1	1	1	-	-	-	1	2	1	2
CO4	2	2	1	1	1	-	-	-	1	2	1	2
CO5	1	3	2	2	1	-	-	-	1	2	1	2
CO6	2	2	2	2	2	-	1	2	3	3	2	3
3 — High : 2 - Medium : 1 — Low : „-„ - No correlation												

LIST OF EXPERIMENTS		
1.	Identification and solving of simple real life or scientific or technical problems, and developing flow charts, algorithms and pseudocode for the same. (Electricity Billing / Retail shop billing/ Sin series/ weight of a motorbike/ Weight of a steel bar/ compute Electrical Current in Three Phase AC Circuit, etc.)	
2.	Python programming using simple statements and expressions (exchange the values of two variables/ circulate the values of n variables/ distance between two points).	
3.	Scientific problems using Conditionals and Iterative loops. (Number series/ Number Patterns/ pyramid pattern)	
4.	Implementing real-time/technical applications using Lists, Tuples. (Items present in a library/Components of a car/ Materials required for construction of a building –operations of list & tuples)	
5.	Implementing real-time/technical applications using Sets, Dictionaries. (Language/ components of an automobile / Elements of a civil structure etc.- operations of Sets & Dictionaries)	
6.	Implementing programs using Functions. (Factorial / largest number in a list/ area of shape)	
7.	Implementing programs using Strings. (reverse / palindrome / character count / replacing characters)	
8.	Implementing real-time/technical applications using File handling. (copy from one file to another, word count, longest word)	
9.	Implementing real-time/technical applications using Exception handling. (divide by zero error / voter‟s age validity / student mark range validation)	
10.	Exploring Pygame tool to Develop a game activity like bouncing ball, car race etc.	
11.	Mini Project (any ONE): Design GUI for • Airline reservation system • Feedback system • Employee management system • Student management system • Banking system	
TOTAL PERIODS:		**60**

EXPERIMENTS BEYOND THE SYLLABUS (Any one)	
1.	Implementing programs using written modules and Python Standard Libraries - pandas, numpy.
2.	Implementing programs using written modules and Python Standard Libraries - Matplotlib, spicy

COURSE DESIGNERS			
1.	Dr.N.Ananthi	Professor & Head	Information Technology
2.	Dr.G.S.Anandha Mala	Professor & Head	Computer Science and Engineering
3.	Mrs.B.Chandra	Assistant Professor	Information Technology
4.	Dr.J.Deepa	Associate professor	Computer Science and Engineering
5.	A.Jeba Sheela	Assistant Professor	Computer Science and Engineering

Recommended by Board of Studies	Date: 20-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231GES215L	Introduction to Civil Engineering Projects (Common to Civil Engineering, Mechanical Engineering) (Activity based Learning)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**2**	**0**	**1**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To impart basic knowledge on Civil Engineering.
2.	To acquire knowledge in Sub disciplines of Civil Engineering
3.	To provide exposure to Real time Projects

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Illustrate the role of Civil Engineer to the Society.	Apply
CO2:	Analyze the problems in transportation engineering projects	Analyze
CO3:	Interpret the issues in real time problems of infrastructure engineering	Analyze
CO4:	Infer the Solutions in real time environmental Projects.	Analyze

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	1	-	-	-	2	2	-	2	2	1	1
CO2	2	1	-	-	-	2	2	-	2	2	1	1
CO3	2	1	-	-	-	2	2	-	2	2	1	1
CO4	2	1	-	-	-	2	2	-	2	2	1	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

UNIT	SCOPE OF CIVIL ENGINEERING	PERIODS
I		6

Overview of Civil Engineering - Civil Engineering contributions to the welfare of Society – Specialized subdisciplines in Civil Engineering – Structural Engineering, Geotechnical Engineering, Environmental Engineering, Transportation and Water Resources Engineering, Construction Management.

UNIT	STUDY ON REAL TIME PROJECTS	PERIODS
II		14

Case studies on Various Real time Industrial Projects.

1. Case studies on Highway.
2. Case studies on Railways, tunneling.
3. Case studies on Airports and Harbours.
4. Case studies on Bridges.
5. Case studies on Tall Structures
6. Case studies on Infrastructure Projects.
7. Case studies on Environmental Engineering.

UNIT	SEMINAR	PERIODS
III		10

Presentation on Real time Projects by students

TOTAL PERIODS:	30

NOTE - Considered Two seminar Hours per week.

TEXT BOOKS:	
1.	Manabendra Saharia, Nagendra R. Velaga, “Introduction to Civil Engineering”, All India Council for Technical Education, New Delhi, 2023.
2.	Handout / Presentation PPT.
REFERENCE BOOKS:	
1.	Ravindra Gettu, Subhadeep Banerjee, “Introduction to Civil Engineering Profession” Indian Institute of Technology Madras, Chennai.

COURSE DESIGNERS			
1.	Dr.S. Lavanya Prabha	Professor	Civil Engineering
2	**Dr. M. Vetrivel Sezhian**	Professor	Mechanical Engineering
3	Dr.R. Gopalakrishnan.	Professor	Civil Engineering

Recommended by Board of Studies	Date:	Syllabus version	
Approved by the Academic Council	Date:	Meeting No.	

231CSC211L	**C PROGRAMMING LABORATORY** (Common to CSE, IT, CSE (AIML), CSE (CS) and AI-DS)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**4**	**0**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To develop programs in C using basic constructs.
2.	To develop applications in C using strings and pointers.
3.	To develop applications in C using functions and structures.
4.	To develop applications in C using file processing.
5.	To develop simple project using C

COURSE OUTCOMES:		Bloom's level
Upon completion of this course, student will be able to:		
CO1:	Develop simple programs using basic constructs in C programming.	K5
CO2:	Develop C programs for simple applications making use of arrays and strings.	K5
CO3:	Implement modular programming with functions.	K3
CO4:	Build programs with storage classes and pointers for memory management.	K6
CO5:	Construct programs with user defined data types.	K6
CO6:	Design applications using file processing techniques.	K5

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	3	1	1	1	2	2	3	2
CO2	3	3	3	3	3	2	2	2	2	2	3	2
CO3	3	3	3	3	3	2	2	2	3	3	3	2
CO4	3	3	3	3	3	2	2	2	3	3	3	2
CO5	3	3	3	2	3	1	1	2	2	3	3	2
CO6	3	3	3	2	3	1	1	2	2	3	3	2
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

LIST OF EXPERIMENTS	
1.	Programs using only I/O functions.
2.	Programs to study operators and data types.
3.	Programs based on control structures (IF, SWITCH CASE).
4.	Programs using FOR and WHILE loops.
5.	Programs using single dimensional arrays.
6.	Programs using multi dimensional arrays.
7.	Programs on Sorting and Searching using arrays.
8.	Programs based on String manipulations.
9.	Programs based on User Defined Functions.
10.	Programs using Functions with Parameters.
11.	Programs using Storage Classes.
12.	Programs to introduce Pointers.
13.	Programs using Structures and Union.
14.	Programs using Array of Structures.
15.	Programs based on Files.
16.	Mini Project
TOTAL PERIODS:	**60**

CONTENT BEYOND SYLLABUS	
1.	Programs using basic graphic functions
2.	Programs using Conditional Compilation directives

LIST OF EQUIPMENTS:	
1.	**HARDWARE**:
	• Standalone desktops. 30nos.
2.	**SOFTWARE**
	• GCC Compiler , Turbo C or equivalent

COURSE DESIGNERS			
1.	Dr G S Anandha Mala	Professor	Computer Science and Engineering
2.	Dr S Ahamed Ali	Assistant Professor	Computer Science and Engineering
3.	Dr A Arockia Abins	Assistant Professor	Computer Science and Engineering
4	Dr J Deepa	Associate Professor	Computer Science and Engineering
5.	Dr V Balaji	Associate Professor	CSE (Cyber Security)

Recommended by Board of Studies	Date: 20-10-2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231BMC211L	**BIOCHEMISTRY LABORATORY** (for Biomedical Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	3	1	2

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To provide practice on quantification of biomolecules
2.	To understand the estimation of biomolecules in pathological condition
3.	To separate the macromolecules
4.	To estimate the interrelationship of biochemical parameters
5.	To learn and interpret the normal values of various biochemical parameter

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Assess the Biochemistry laboratory functional components.	K6
CO2:	Evaluate various qualitative tests for different biomolecules.	K5
CO3:	Summarize the biochemical parameter of blood sample	K5
CO4:	Formulate the separation technology of amino acids	K6
CO5:	Build an experimental setup for the electrophoresis.	K6

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	3	-	1	-	1	-	1	-
CO2	3	3	3	3	3	-	1	-	1	-	1	-
CO3	3	3	3	3	3	-	1	-	1	-	1	-
CO4	3	3	3	3	3	-	1	-	1	-	1	-
CO5	3	3	3	3	3	-	1	-	1	-	1	-
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

S. No	**NAME OF THE EXPERIMENT**
1	General tests for Carbohydrates, proteins and lipids
2	Preparation of serum and plasma from blood
3	Estimation of blood glucose by glucose oxidize method
4	Estimation of Creatinine
5	Estimation of Urea
6	Estimation of Cholesterol
7	Assay of SGOT/SGPT
8	Study on separation of proteins by SDS Electrophoresis
9	Separation of amino acids by thin layer chromatography
10	Study on separation of DNA by agarose gel electrophoresis
11	Estimation of iodine value of fats of oils
EXPERIMENT BEYOND THE SYLLABUS	
ANY ONE EXPERIMENT	
12	Preparation of solutions: 1) percentage solutions, 2) molar solutions, 3) normal solutions
13	Study of Bone Marrow Chart

TOTAL PERIODS:	**60**

REFERENCE BOOKS:	
1	Biochemistry Laboratory Manual, Department of Biomedical Engineering, Easwari Engineering College.

COURSE DESIGNERS			
1.	Dr.G.Babu	Professor & Head	Biomedical Engineering
2.	Dr.K.Yamuna Devi	Assistant Professor	Biomedical Engineering
3.	Dr.B.Suresh Chander Kapali	Assistant Professor	Biomedical Engineering
4.	Ms.K.Shruthi	Assistant Professor	Biomedical Engineering

Recommended by Board of Studies	Date: 28.10.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231ECC211L	CIRCUITS AND DEVICES LABORATORY (for Electronics and Communication Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**3**	**1**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To learn the characteristics of basic electronic devices such as Diode, BJT, FET.
2.	To understand the working of resonant circuits
3.	To implement network reduction theorems in electric circuits.
4.	To gain hands on experience in Electric circuits and Electron Devices using simulation software.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Verify Kirchoffs voltage and Kirchoffs current law in electric circuits.	K4
CO2:	Validate the network reduction theorems in electric circuits.	K4
CO3:	Determine the frequency of series and parallel Resonance circuits.	K4
CO4:	Analyse the characteristics of basic electronic devices.	K4
CO5:	Synthesis the characteristics of Electronic Devices using simulation software.	K4

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	2	3	-	-	-	2	2	-	2
CO2	3	2	2	2	3	-	-	-	2	2	-	2
CO3	3	2	2	2	3	2	1	-	2	2	-	2
CO4	3	2	2	2	3	2	1	-	2	2	-	2
CO5	3	2	2	2	3	2	1	-	2	2	-	2
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

LIST OF EXPERIMENTS

1. Verification of KVL & KCL.
2. Verification of Thevenin's and Maximum power transfer theorem.
3. Verification of Super Position Theorem.
4. Verification of Reciprocity Theorem.
5. Determination of Resonance Frequency of Series & Parallel RLC Circuits
6. V-I Characteristics of PN Junction Diode.
7. V-I Characteristics of Zener diode.
8. Common Emitter Transistor Input-Output Characteristics.
9. Drain and Transfer characteristics of JFET
10. Simulation of characteristics of Electric circuits an Electronic devices using SPICE/Multisim

TOTAL PERIODS:	**60**

COURSE DESIGNERS			
1.	Dr.M.Devaraju	Professor and Head	Department of ECE
2.	Dr.D.C.Diana	Associate Professor	Department of ECE
3.	Mrs.K.Abirami	Assistant Professor (Sr. Gr)	Department of ECE
4.	Ms.S.Suruthi	Assistant Professor	Department of ECE

Recommended by Board of Studies	Date: 28.102023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231EEC211L	ELECTRIC CIRCUITS LABORATORY (for Electrical and Electronics Engineering)	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**4**	**0**	**2**

SCHEME OF EXAMINATION						
Duration of End Semester Examination in Hours	Maximum Marks - 100			Minimum Marks for Pass - 50		
	Weightage			Weightage		Overall
	Continuous Assessment Examination	End Semester Examination		Continuous Assessment Examination	End Semester Examination	
3	60 %	40 %		-	45%	50%

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	To provide practical experience with simulation of electrical circuits and verifying circuit theorems.

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Calculate the voltage and current in a circuit using Kirchhoff's laws.	Apply
CO2:	Evaluate the circuit parameters using various theorems in an electric network.	Apply
CO3:	Simulate resonant circuits in transient conditions	Apply
CO4:	Measure various parameters using oscilloscopes and measuring instruments.	Apply
CO5:	Simulate three phase circuits.	Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
Cos	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	1	1	3	-	-	1	2	1	1	2
CO2	3	3	1	1	3	-	-	1	2	1	1	2
CO3	3	2	1	1	3	-	-	1	2	1	1	2
CO4	2	2	1	1	3	-	-	1	2	1	1	2
CO5	3	3	1	1	3	-	-	1	2	1	1	2
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

LIST OF EXPERIMENTS
1. Experimental verification of Kirchhoff's voltage and current laws 2. Experimental verification of network theorems (Thevenin, Norton, Superposition and maximum Power transfer Theorem). 3. Study of CRO and measurement of sinusoidal voltage, frequency and power factor. 4. Experimental determination of time constant of series R-C electric circuits. 5. Design and Simulation of series resonance circuit. 6. Design and Simulation of parallel resonant circuits. 7. Simulation of three phase balanced and unbalanced star, delta networks circuits. 8. Experimental determination of power in three phase circuits by two-watt meter method. 9. Calibration of single phase energy meter. 10. Determination of two port network parameters.

TOTAL PERIODS:	**60**

COURSE DESIGNERS			
1.	Dr.P.Marish Kumar	Associate Professor	EEE
2.	Mrs.J.Lydia	Assistant Professor	EEE

Recommended by Board of Studies	Date: 30.10.2023	Syllabus version	1
Approved by the Academic Council	Date: 24-01-2024	Meeting No.	6

231BTC211L	BIOORGANIC CHEMISTRY LABORATORY	Periods per week				Credits
		L	T	P	R	
Regulation - R23		**0**	**0**	**3**	**1**	**2**

SCHEME OF EXAMINATION					
Duration of End Semester Examination in Hours	Marks			Minimum marks for Pass	
	Continuous assessment Examination	End Semester Examination	Maximum marks	End Semester Examination	Total
3	60	40	100	45	50

PREREQUISITES:
Nil

COURSE OBJECTIVES:	
1.	Make the students understand the mechanism of synthesis of different chemical moieties
2.	Familiarise the students with the isolation of biomolecules from natural sources

COURSE OUTCOMES (COs):		
Upon completion of this course, student will be able to:		Bloom's level
CO1:	Comprehend the mechanism of reactions	K3, Apply
CO2:	Be able to synthesize various Bioorganic compounds	K3, Apply
CO3:	Be able to work independently for the experimentation.	K3, Apply

MAPPING OF COURSE OUTCOMES (CO) WITH PROGRAMME OUTCOME (PO)												
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	3	-	1	-	1	-	-	-	2	1
CO2	3	2	3	-	1	-	1	-	-	-	2	1
CO3	3	2	3	-	1	-	1	-	-	-	2	1
3 – High : 2 - Medium : 1 – Low : '-' - No correlation												

List of experiments: (Any Five Experiments)
1. Synthesis of aspirin 2. Hydrolysis of sucrose 3. Preparation of pyruvic acid from tartaric acid 4. Preparation of oleic acid from tartaric acid 5. Preparation of alpha D- glucopyranose pentaacetate 6. Preparation of 1,2,5,6 dicyclohexylnoine alpha d glucofuranose 7. Isolation of lycopene from tomato paste 8. Preparation of L-proline 9. Preparation of L-cysteine from hair 10. Preparation of S-ethylhydroxyl butonate from methylacetoacetate using yeast
Content beyond the syllabus: (Any one)
1. Resolution of S-ethyl hydroxyl butonate using 3,5 dinitro benzoate. 2. Preparation of 5,10,15,20-tetrakisphenylporphyrin.

TOTAL PERIODS:	**60**

TEXT BOOKS:	
1.	Organic Chemistry, Francis A.Carey, VII Edition, Tata MCGraw Hill, Fourth reprint 2009
2.	Organic and Bio-organic Mechanisms, M.I. Page and Andrew Williams. Pearson, FirstImpression, 2010.

COURSE DESIGNERS			
1.	Dr. G. Babu	HOD	Department of Biomedical Engineering
2.	Dr. K. Yamuna Devi	Assistant Professor	Department of Biomedical Engineering
3.	Dr. S. Sathish	Assistant Professor	Department of Biomedical Engineering
4.	Mrs. B. Lakshmi Shree	Assistant Professor	Department of Biomedical Engineering

Recommended by Board of Studies	Date: 11.05.2024	Syllabus version	1
Approved by the Academic Council	Date:	Meeting No.	1