National Education Policy (NEP)
Scheme and Syllabus (I Year)

(Electrical and Electronics Engineering Stream)

(With effect from 2022-23 Academic Year)

Bachelor Degree in Engineering

Out Come Based Education

with

Choice Based Credit System

P.E.S. College of Engineering, Mandya - 571 401, Karnataka

(An Autonomous Institution Affiliated to VTU, Belagavi)

Grant-in-Aid Institution (Government of Karnataka),

Accredited by NBA (All UG Programs), NAAC & Approved by AICTE, New Delhi.

Phone : +91-8232- 220043/238042/220120/238330/238683

Fax : 08232 – 222075

E-Mail: principal@pesce.ac.in; Web : www.pescemandya.org, www.pesce.ac.in

P.E.S. COLLEGE OF ENGINEERING, MANDYA

Scheme of Teaching and Examinations - 2022
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

B.E. I-Semester [Chemistry Group] - Electrical & Electronics Engineering Stream (EEE)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MAEE101	Calculus, Ordinary Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22CHEE102	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
3	**ESC** P22CED103	Computer – Aided Engineering Drawing	ME / IP / AU	2	-	2	-	3	50	50	100
4	**ESC** P22ESC104X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	**ETC** P22ETC105X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P22PLC105X	Programming Languages Course-I (IC)		2	-	2	-	3	50	50	100
6	**AEC** P22ENG106	Communicative English - I	Humanities	-	2	-	-	1	50	50	100
7	P22KSK107 / P22KBK107	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	1	50	50	100
	OR										
	HSMS P22ICO107	Indian Constitution									
8	**AEC/SDC** P22IDT108	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P22SFH108	Scientific Foundations for Health									
Total								**20**	**400**	**400**	**800**

SDA - Skill Development Activities, **ASC** - Applied Science Course, **ESC** - Engineering Science Courses, **ETC** - Emerging Technology Course, **AEC** - Ability Enhancement Course, **HSMS** - Humanity and Social Science and management Course, **CIE** – Continuous Internal Evaluation, **SEE** - Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course), **SDC** - Skill Development Course

Credit Definition:	
1- hour Lecture (**L**) per week=**1Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session
2-hoursTutorial(**T**) per week=**1Credit**	04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions
2- hours Practical / Drawing (**P**) per week=**1Credit**	03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02-Credits courses are to be designed for 25 hours of Teaching-Learning Session
2-hous Skill Development Actives (**SDA**) per week = **1 Credit**	01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXUREI of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

#-P22CHEE102 SEE shall have the 03 hours of theory examination and 03 hours of practical examination **ESC** or **ETC** of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).

All **01 Credit- courses** shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ.

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
P22ESC1041	Introduction to Civil Engineering	3	0	0	P22ETC1051	Green Buildings	3	0	0
P22ESC1042	Introduction to Electrical Engineering	3	0	0	P22ETC1052	Operation and Maintenance of Solar Electric Systems	3	0	0
P22ESC1043	Introduction to Electronics Engineering	3	0	0	P22ETC1053	Introduction to Embedded System	3	0	0
P22ESC1044	Introduction to Mechanical Engineering	3	0	0	P22ETC1054	Renewable Energy Sources	3	0	0
P22ESC1045	Introduction to C Programming	2	0	2	P22ETC1055	Introduction to Internet of Things (IOT)	3	0	0
					P22ETC1056	Smart Materials and Systems	3	0	0
					P22ETC1057	Introduction to Cyber Security	3	0	0
					Note: ETC list shall be defined by the concerned department				

(PLC-I) Programming Language Courses-I				
Code	**Title**	**L**	**T**	**P**
P22PLC1051	Introduction to Web Programming	2	0	2
P22PLC1052	Introduction to Python Programming	2	0	2
P22PLC1053	Basics of JAVA programming	2	0	2
P22PLC1054	Introduction to C++ Programming	2	0	2

- ***The student has to select one course from the ESC-I group.***
- ***EEE Students shall opt for any one of the courses from the ESC-I group except, P22ESC1042- Introduction to Electrical Engineering and ECE students shall opt any one of the courses from ESC-I except P22ESC1043 Introduction to Electronics Engineering***
- ***The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester***
- ***The students must select one course from either ETC-I or PLC-I group.***
- ***If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa***

P.E.S. COLLEGE OF ENGINEERING, MANDYA

Scheme of Teaching and Examinations - 2022
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

B.E. II – Semester [Physics Group] – Electrical & Electronics Engineering Stream (EEE)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MAEE201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22PHEE202	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	**ESC** P22EEE203 Or P22BEE203	Elements of Electrical Engineering **OR** Basic Electronics	EE / EC	2	2	-	-	3	50	50	100
4	**ESC** P22ESC204X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	**ETC** P22ETC205X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P22PLC205X	Programming Languages Course-I (IC)		2	-	2	-	3	50	50	100
6	**AEC** P22ENG206	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
7	P22KSK207 / P22KBK207	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	1	50	50	100
	OR										
	HSMS P22ICO207	Indian Constitution									
8	**AEC/SDC** P22IDT208	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P22SFH208	Scientific Foundations for Health									
Total								**20**	**400**	**400**	**800**

SDA - Skill Development Activities, **ASC** - Applied Science Course, **ESC** - Engineering Science Courses, **ETC** - Emerging Technology Course, **AEC** - Ability Enhancement Course, **HSMS** - Humanity and Social Science and management Course, **CIE** – Continuous Internal Evaluation, **SEE** - Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course), **SDC** - Skill Development Course

Credit Definition:	
1- hour Lecture (**L**) per week=**1Credit** 2-hoursTutorial(**T**) per week=**1Credit** **2**- hours Practical / Drawing (**P**) per week=**1Credit** 2-hous Skill Development Actives (**SDA**) per week = **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02-Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXUREI of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

#-P22PHEE102 SEE shall have the 03 hours of theory examination and 03 hours of practical examination **ESC** or **ETC** of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).

All **01 Credit- courses** shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ.

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
P22ESC2041	Introduction to Civil Engineering	3	0	0	P22ETC2051	Green Buildings	3	0	0
P22ESC2042	Introduction to Electrical Engineering	3	0	0	P22ETC2052	Operation and Maintenance of Solar Electric Systems	3	0	0
P22ESC2043	Introduction to Electronics Engineering	3	0	0	P22ETC2053	Introduction to Embedded System	3	0	0
P22ESC2044	Introduction to Mechanical Engineering	3	0	0	P22ETC2054	Renewable Energy Sources	3	0	0
P22ESC2045	Introduction to C Programming	2	0	2	P22ETC2055	Introduction to Internet of Things (IOT)	3	0	0
					P22ETC2056	Smart Materials and Systems	3	0	0
					P22ETC2057	Introduction to Cyber Security	3	0	0
					Note: ETC list shall be defined by the concerned department				

(PLC-I) Programming Language Courses-I				
Code	**Title**	**L**	**T**	**P**
P22PLC2051	Introduction to Web Programming	2	0	2
P22PLC2052	Introduction to Python Programming	2	0	2
P22PLC2053	Basics of JAVA programming	2	0	2
P22PLC2054	Introduction to C++ Programming	2	0	2

- ***The student has to select one course from the ESC-I group.***
- ***EEE Students shall opt for any one of the courses from the ESC-I group except, P22ESC2042- Introduction to Electrical Engineering and ECE students shall opt any one of the courses from ESC-I except P22ESC2043 Introduction to Electronics Engineering***
- ***The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester***
- ***The students must select one course from either ETC-I or PLC-I group.***
- ***If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa***

P.E.S. COLLEGE OF ENGINEERING, MANDYA

Scheme of Teaching and Examinations - 2022
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

B.E. I - Semester [Physics Group] - Electrical & Electronics Engineering Stream (EEE)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MAEE101	Calculus, Ordinary Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22PHEE102	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	**ESC** P22EEE103 Or P22BEE103	Elements of Electrical Engineering **OR** Basic Electronics	EE / EC	2	2	-	-	3	50	50	100
4	**ESC** P22ESC104X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	**ETC** P22ETC105X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P22PLC105X	Programming Languages Course-I (IC)		2	-	2	-	3	50	50	100
6	**AEC** P22ENG106	Communicative English - I	Humanities	-	2	-	-	1	50	50	100
7	P22KSK107 / P22KBK107	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	1	50	50	100
	OR										
	HSMS P22ICO107	Indian Constitution									
8	**AEC/SDC** P22IDT108	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P22SFH108	Scientific Foundations for Health									
Total								**20**	**400**	**400**	**800**

SDA - Skill Development Activities, **ASC** - Applied Science Course, **ESC** - Engineering Science Courses, **ETC** - Emerging Technology Course, **AEC** - Ability Enhancement Course, **HSMS** - Humanity and Social Science and management Course, **CIE** – Continuous Internal Evaluation, **SEE** - Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course), **SDC** - Skill Development Course

Credit Definition:	
1- hour Lecture (**L**) per week=**1Credit** 2-hoursTutorial(**T**) per week=**1Credit** **2**- hours Practical / Drawing (**P**) per week=**1Credit** 2-hous Skill Development Actives (**SDA**) per week = **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02-Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXUREI of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

#-P22PHEE102 SEE shall have the 03 hours of theory examination and 03 hours of practical examination **ESC** or **ETC** of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).

All **01 Credit- courses** shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ.

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
P22ESC1041	Introduction to Civil Engineering	3	0	0	P22ETC1051	Green Buildings	3	0	0
P22ESC1042	Introduction to Electrical Engineering	3	0	0	P22ETC1052	Operation and Maintenance of Solar Electric Systems	3	0	0
P22ESC1043	Introduction to Electronics Engineering	3	0	0	P22ETC1053	Introduction to Embedded System	3	0	0
P22ESC1044	Introduction to Mechanical Engineering	3	0	0	P22ETC1054	Renewable Energy Sources	3	0	0
P22ESC1045	Introduction to C Programming	2	0	2	P22ETC1055	Introduction to Internet of Things (IOT)	3	0	0
					P22ETC1056	Smart Materials and Systems	3	0	0
					P22ETC1057	Introduction to Cyber Security	3	0	0
					Note: ETC list shall be defined by the concerned department				

(PLC-I) Programming Language Courses-I				
Code	**Title**	**L**	**T**	**P**
P22PLC1051	Introduction to Web Programming	2	0	2
P22PLC1052	Introduction to Python Programming	2	0	2
P22PLC1053	Basics of JAVA programming	2	0	2
P22PLC1054	Introduction to C++ Programming	2	0	2

- ***The student has to select one course from the ESC-I group.***
- ***EEE Students shall opt for any one of the courses from the ESC-I group except, P22ESC1042- Introduction to Electrical Engineering and ECE students shall opt any one of the courses from ESC-I except P22ESC1043 Introduction to Electronics Engineering***
- ***The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester***
- ***The students must select one course from either ETC-I or PLC-I group.***
- ***If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa***

P.E.S. COLLEGE OF ENGINEERING, MANDYA

Scheme of Teaching and Examinations - 2022
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2022-23)

B.E. II-Semester [Chemistry Group] - Electrical & Electronics Engineering Stream (EEE)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MAEE201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22CHEE202	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
3	**ESC** P22CED203	Computer – Aided Engineering Drawing	ME / IP / AU	2	-	2	-	3	50	50	100
4	**ESC** P22ESC204X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
5	**ETC** P22ETC205X	Emerging Technology Course-I	Any Engg. Dept	3	-	-	-	3	50	50	100
	OR										
	PLC P22PLC205X	Programming Languages Course-I (IC)		2	-	2	-	3	50	50	100
6	**AEC** P22ENG206	Communicative English - II	Humanities	-	2	-	-	1	50	50	100
7	P22KSK207 / P22KBK207	Samskrutika Kannada/ Balake Kannada	Humanities	-	2	-	-	1	50	50	100
	OR										
	HSMS P22ICO207	Indian Constitution									
8	**AEC/SDC** P22IDT208	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P22SFH208	Scientific Foundations for Health									
Total								**20**	**400**	**400**	**800**

SDA - Skill Development Activities, **ASC** - Applied Science Course, **ESC** - Engineering Science Courses, **ETC** - Emerging Technology Course, **AEC** - Ability Enhancement Course, **HSMS** - Humanity and Social Science and management Course, **CIE** – Continuous Internal Evaluation, **SEE** - Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course), **SDC** - Skill Development Course

Credit Definition:	
1- hour Lecture (**L**) per week=**1Credit** 2-hoursTutorial(**T**) per week=**1Credit** **2**- hours Practical / Drawing (**P**) per week=**1Credit** 2-hous Skill Development Actives (**SDA**) per week = **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions 03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions

Student's Induction Program: Motivating (Inspiring) Activities under the Induction program – The main aim of the induction program is to provide newly admitted students a broad understanding of society, relationships, and values. Along with the knowledge and skill of his/her study, students' character needs to be nurtured as an essential quality by which he/she would understand and fulfill the responsibility as an engineer. The following activities are to be covered in 21 days. Physical Activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to Local areas, Familiarization with Department/Branch and Innovation, etc. For details, refer the ANNEXUREI of Induction Programs notification of the University published at the beginning of the 1st semester.

AICTE Activity Points to be earned by students admitted to BE/ B.Tech., / B. Plan day college program (For more details refer to Chapter 6, AICTE Activity Point Program, Model Internship Guidelines): Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4 years Degree programs through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Program. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to VTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card. The activities can be spread over the years, any time during the semester weekends, and holidays, as per the liking and convenience of the student from the year of entry to the program. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) do not affect SGPA/CGPA and shall not be considered for vertical progression. In case students fail to earn the prescribed activity Points, an Eighth Semester Grade Card shall be issued only after earning the required activity points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

#-P22CHEE202 SEE shall have the 03 hours of theory examination and 03 hours of practical examination **ESC** or **ETC** of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required practical learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0).

All **01 Credit- courses** shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ.

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**	**P**
P22ESC2041	Introduction to Civil Engineering	3	0	0	P22ETC2051	Green Buildings	3	0	0
P22ESC2042	Introduction to Electrical Engineering	3	0	0	P22ETC2052	Operation and Maintenance of Solar Electric Systems	3	0	0
P22ESC2043	Introduction to Electronics Engineering	3	0	0	P22ETC2053	Introduction to Embedded System	3	0	0
P22ESC2044	Introduction to Mechanical Engineering	3	0	0	P22ETC2054	Renewable Energy Sources	3	0	0
P22ESC2045	Introduction to C Programming	2	0	2	P22ETC2055	Introduction to Internet of Things (IOT)	3	0	0
					P22ETC2056	Smart Materials and Systems	3	0	0
					P22ETC2057	Introduction to Cyber Security	3	0	0
					Note: ETC list shall be defined by the concerned department				

(PLC-I) Programming Language Courses-I				
Code	**Title**	**L**	**T**	**P**
P22PLC2051	Introduction to Web Programming	2	0	2
P22PLC2052	Introduction to Python Programming	2	0	2
P22PLC2053	Basics of JAVA programming	2	0	2
P22PLC2054	Introduction to C++ Programming	2	0	2

- ***The student has to select one course from the ESC-I group.***
- ***EEE Students shall opt for any one of the courses from the ESC-I group except, P22ESC2042- Introduction to Electrical Engineering and ECE students shall opt any one of the courses from ESC-I except P22ESC2043 Introduction to Electronics Engineering***
- ***The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester***
- ***The students must select one course from either ETC-I or PLC-I group.***
- ***If students study the subject from ETC-I in 1st semester he/she has to select the course from PLC-II in the 2nd semester and vice-versa***

Calculus, Ordinary Differential Equations and Linear Algebra

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I

Course Code:	**P22MAEE101**	**CIE Marks:**	**50**
Course Type (Theory/Practical/Integrated)	**Integrated**	**SEE Marks:**	**50**
		Total Marks:	**100**
Teaching Hours/Week (L:T:P):	**2:2:2:0**	**Exam Hours:**	**03**
Total Hours of Pedagogy	**40 hours Theory + 10 to12 Lab slots**	**Credits:**	**04**

Course Learning Objectives:

1	**Familiarize** the importance of calculus associated with one variable and two variables.
2	**Analyze** Engineering problems by applying Ordinary Differential Equations
3	**Develop** the knowledge of Linear Algebra to solve system of equation by using matrices

Unit	Syllabus content	No. of hours	
		Theory	**Tutorial**
I	**Polar coordinates and curvature:** Introduction, Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems. **Self - study:** Center and circle of curvature, evolutes and involutes.	06	02
II	**Series Expansion and Multivariable Calculus:** Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule, problems. Partial differentiation, total derivative - differentiation of composite functions. Jacobian andproblems. Maxima and minima for a function of two variables. Problems. **Self - study:** Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.	06	02
III	**Ordinary Differential Equations (ODEs) of first order**: Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations Integrating factors on [illegible] Applications of ODE's - Orthogonal trajectories, Newton's law of cooling. **Nonlinear differential equations**: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations. Problems. Self-Study: Applications of ODE's: Solvable for x and y. .	06	02
IV	**Ordinary Differential Equations of higher order:** Higher-order linear ODE's with constant coefficients - Inverse differential operator, case-I to case-IV, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations. Problems **Self - study:** Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients.	06	02

V	**Linear Algebra:** Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigen values and Eigenvectors, Rayleigh's power method to find the dominant Eigen value and Eigenvector. **Self-Study**: Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.	06	02

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the translation of coordinate system, various types of series of functions, identify the variation of multivariables, and match the system of equations in matrix form

CO2: Explain the graph of function relate to polar coordinates, interpret series of continuous function and demonstrate the methods to describe mathematical solution to equations related to Engineering problems.

CO3: Apply the Mathematical properties to solve illustrative Engineering problems, calculate Maxima and minima of a function and cal culate Eigen value relate to Eigenvector of system of equations.

CO4: Analyze the Mathematical model of differential and systems of equations of more than one variable classify various solutions to problems, enumerate numerical solutions to system of equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International PublishingHouse Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2010.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011/
4. https://ocw.mit.edu/courses/18-06sc-linear-algebra-fall-2011/
5. https://math.hmc.edu/calculus/hmc-mathematics-calculus-online-tutorials/differential-equations/first-order-differential-equations/

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**										
CO2	**2**	**3**										
CO3	**3**	**2**										
CO4	**2**	**3**										
Strength of correlation: Low-1, Medium- 2, High-3												

Applied Physics
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code:	**P22PHEE102/202**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Integrated**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**2:2:2:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours Theory + 10 to12 Lab slots**	**Credits**	**04**

Course Learning Objectives:

- To **recall** the concepts of physics related to waves and oscillations, quantum mechanics, elastic properties of materials, fundamentals of LASER and optical fibers
- To **realize** the concepts of modern physics and quantum mechanics in engineering applications
- To **study** the dielectric and superconducting properties of materials and their applications.
- To **understand** the electrical and magnetic properties of materials and their applications
- To **learn** the basics of photonics in understanding the applications of LASERs and optical fibers
- To **explore** the rudimental concepts of semiconductors in construction of electronic devices

Pedagogy:
Techniques and strategies which teachers may adopt to achieve maximum attainment of the objectives.

1. Chalk and Talk
2. Flipped Class
3. Blended mode of learning
4. Interactive simulations and animations
5. Online learning videos on theory topics
6. Hands-on and open ended experiments

Unit-I: Quantum Physics: **8 Hours**

Matter Waves - de Broglie Hypothesis, Phase Velocity and Group Velocity, relation between phase velocity and group velocity, relation between group velocity and particle velocity, de Broglie wavelength and its derivation by group velocity concept, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus).

Wave Mechanics - Wave Function, Probability density and normalization, Time independent Schrodinger wave equation (derivation), Eigen functions and Eigen Values, Application: Eigen values and Eigen functions of particle in a one dimensional potential well of infinite depth (derivation). Numerical Problems.

Pre requisites: Quantum theory of Radiation

Self-learning component: Blackbody Radiation Spectrum

Practical Component: Stefan-Boltzmann law and Planck's Constant.

Unit-II: Properties of Materials **8 Hours**

Dielectric Materials - Polar and non-polar dielectrics, Types of Polarization and their mechanism, internal fields in solid (derivation), Clausius-Mossotti equation (derivation). Application of dielectrics in transformers, Capacitors.

Superconducting Materials - Superconductors, Temperature dependence of resistivity, Meissner Effect (diamagnetic property), Critical field, Critical Current, Types of Superconductors, BCS theory (Qualitative), High Temperature superconductors, Applications: Maglev vehicles, SQUIDs (Qualitative). Numerical problems.

Pre requisites: Introduction on Dielectrics.

Self-learning component: Dielectrics in Electrical Insulation and Superconducting magnets
Practical component: Dielectric constant of a material

Unit-III: Electric and Magnetic properties of materials **8 Hours**

Electrical properties – Failures of classical free electron theory, Quantum free electron theory, Assumptions, Fermi-Dirac Statistics (Qualitative). Fermi level, Fermi-energy, Fermi temperature, Fermi velocity and Fermi factor, Variation of Fermi factor with energy and temperature, Expression for density of states (derivation), Mention the expression for Fermi energy and electron density. Merits of quantum free electron theory.

Magnetic properties - Classification of magnetic materials, ferromagnetic materials – Weiss domain theory, hysteresis in ferromagnetic materials, explanation of hysteresis using domain theory, soft and hard magnetic materials, ferrites, Applications: magnetic recording and readout, storage of magnetic data.

Pre requisites: Classical free electron theory
Self-learning: Expression for electron and hole concentration of an intrinsic semiconductor
Practical component: Fermi-energy and Hysteresis curve

Unit-IV: Photonics **8 Hours**

Lasers - Definition and Characteristics of LASER, Interaction of radiation with matter, Expression for energy density (derivation). Requisites of a Laser system. Conditions for Laser action. Principle, Construction and working of Semiconductor LASER. Applications: LASER spectroscopy and Holography.

Optical Fibers - Propagation mechanism, angle of acceptance and Numerical aperture (derivation), fractional index change, modes of propagation, Number of modes and V - parameter, Types of optical fibers. Attenuation and expression for attenuation coefficient (no derivation), Applications: Communication, Point to point telecommunication. Numerical problems.

Pre requisite: Introduction on LASER and Optical fibers.
Self-learning component: Construction and working of carbon dioxide laser
Practical component: Diffraction Grating and Optical fiber

Unit-V: Semiconductors and devices **8 Hours**

Semiconductors, Types of semiconductors, Fermi level, variation of Fermi level in intrinsic and extrinsic semiconductors with temperature, Fermi factor and density of states (qualitative), derivation for electron concentration (N_e) and mention the expression for hole concentration (N_h) of an intrinsic semiconductor, Relation between Fermi level and energy gap of an intrinsic semiconductor, Law of mass action, Expression for intrinsic charge carrier concentration (N_i). Electrical conductivity and resistivity of an intrinsic semiconductor (derivation). Applications: BJT, FET, MOSFET; IC's: Digital integrated circuits. Numerical problems.

Pre requisites: Introduction on semiconductors, Band theory of solids.
Self-learning component: Expression for hole concentration of an intrinsic semiconductor.
Practical component: Four probe method, Transistor Characteristics and LCR Circuit

Practical Component:

The laboratory experiments are classified as Exercise/hands on, open ended, demonstration and structured inquiry. From the list of experiments given below, student must perform **minimum of 10**

experiments.

Sl. No.	Name of the Experiment	Type
1	Verification of Stefan - Boltzmann law	Hands on
2	Verification of Planck's Constant	Hands on
3	Charging and discharging of a capacitor - Dielectric Constant	Hands on
4	Wavelength of Laser - Diffraction Grating	Hands on
5	output and transfer characteristics of a Transistor	Hands on
6	Series and parallel circuits - LCR Resonance	Hands on
7	Determination of Fermi energy of copper	Hands on
8	Energy gap of a semiconductor - Four probe	Hands on
9	Velocity of Ultrasonic – Ultrasonic interferometer	Open ended
10	Numerical aperture and acceptance angle of an Optical fiber	Open ended
11	GNU step interactive simulations	Demonstration
12	PHET interactive simulations (Hysteresis)	Demonstration
13	GNU step interactive simulations (Self activity)	Structured inquiry
14	Study of motion using spreadsheet (Self activity)	Structured inquiry

Course Outcomes: Students will be able to	
CO1	**Apply** the fundamental concepts of physics to understand advanced principles of quantum mechanics, dielectric, superconducting, electric and magnetic properties of materials, photonics and semiconductors.
CO2	**Identify** the engineering applications of quantum mechanics, properties of materials, photonics and semiconductors with basic knowledge of physics.
CO3	**Formulate** the mathematical expressions for an advanced physical quantity related to engineering field using theoretical knowledge of physics.
CO4	**Solve** the numerical problems related to engineering field in quantum mechanics, materials properties, photonics and semiconductors by the knowledge of mathematics.
CO5	**Analyze** the experimental results with theory by Constructing the circuit/Setting up the experiment related to Applied physics.

COs – POs mapping

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

Levels: 3-Highly mapped; 2- Moderately mapped; 1 – Fairly mapped; 0 – Not mapped

Suggested LearningResources:

Books

1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road,Daryaganj, NewDelhi-110002.
2. A text book of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition,S Chand and Company Ltd. New Delhi-110055.

Reference Books

1. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002
2. N.H. Ayachit, P. K. Mittal: Engineering Physics – I. K. International Publishing House Pvt. Ltd. New Delhi
3. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd edition.
4. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, PearsonEducation Asia Pvt. Ltd., New Delhi.
5. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition

Web links and Video Lectures (e-Resources):

Web links:
Diffraction Grating: https://youtu.be/th9-Ylp0FcU
Transistor Characteristics: https://youtu.be/tCnNAyHv0s0
LCR Resonance Circuit: https://youtu.be/5qbr-F4H7n0
Four Probe Method: https://youtu.be/OAybDK0T68k
Fermi Energy: https://youtu.be/i2bf3_X4h74
Stefan-Boltzmann Constant: https://youtu.be/pBwn1TMkmJ8
Planck's constant: https://youtu.be/nWcejb3S2zY
Dielectric Constant: https://youtu.be/vOTbXNs34j8

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

http://nptel.ac.in
https://swayam.gov.in
https://virtuallabs.merlot.org/vl_physics.html
https://phet.colorado.edu
https://www.myphysicslab.com

Scheme of Evaluation
Marks distribution for the Evaluation of I/II Sem Applied Physics Course

Assessment Method	Component	Type of Assessment	Assessment Type used	Max. Marks Assigned	Evaluated for Total Marks	Reduced Marks to 50%	Min. Eligible marks	Min. Marks Required	Max. Marks Allotted
CIE	Theory	AAT	Assignments	10	50	25	10	20	50
		Test - 1	Theory + Quiz	40					
		Test - 2	Theory + Quiz						
	Lab	Conduction of Experiments	Performance with Record	25	50	25	10		
		Lab test	Evaluation & Viva-Voce	25					
SEE	Theory	End Exam	Part - A	10	100	50	35/100	20	50
			Part - B	90					
Note: *Min. marks from SEE shall be **35/100**, but the aggregate marks from CIE & SEE must be **40/100***								**40**	**100**

Applied Chemistry
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code:	**P22CHEE102/202**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Integrated**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**2:2:2:0**	**Exam Hours**	**03+02**
Total Hours of Pedagogy	**40 hours Theory + 10-12 Lab slots**	**Credits**	**04**

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineeringapplications.
- To develop an intuitive understanding of chemistry by emphasizing the related branchesof engineering.
- To provide students with a solid foundation in analytical reasoning required to solvesocietal problems.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the variouscourse outcomes and make Teaching –Learning more effective

- Tutorial & remedial classes for needy students of small batches (not regular T/R)
- Demonstration of concepts either by building models or byindustry visit
- Experiments in laboratories using non- conventional methods
- Use of ICT – Online videos, online courses
- Use of Google classroom for assignments/Notes
- Conducting Make up class / Bridge courses for needy students
- Publication of paper in conference or journal on Teaching & Learning Process

MODULE 1: Chemistry of electronic materials **8hours**

Conductors , Semiconductors and insulators: Introduction, principle with examples, Semiconductors- production of electronic grade silicon- Czochralski process (CZ) and float zone (FZ) methods. Purification of silicon by zone refiner.

Electro-plating and Electro-less plating – Introduction, Factors affecting nature of deposits, Differences, Principles, Technological importance. Electro-plating of nickel and Electro-less plating of copper on PCB and their applications

Polymers: Introduction, Molecular weight - Number average, weight average and numerical problems, Conducting polymers – synthesis and conducting mechanism of poly-acetylene. Preparation, properties and commercial applications of graphene oxide.

Self-Study components: Electroplating of Gold and Chromium and Electro-less plating of Nickel.

MODULE 2: Energy conversion and Solar energy **8 Hours**

Batteries: Introduction, classification of batteries, characteristics, components, construction, working and applications of modern batteries: Li-ion battery, differences between Li-ion and Na-ion battery and silver oxide-zinc battery.

Fuel cells: Introduction, construction, working and applications of methanol–oxygen and polymer electrolyte fuel cell.

Solar energy: Introduction, importance of solar PV cell, construction and working solar PV cell, advantages and disadvantages.

Self-Study Components: Electrodes for electrostatic double layer capacitors, pseudo capacitors,and hybrid capacitor.

MODULE 3: Corrosion science and e-waste management **8 Hours**

Corrosion: Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration, caustic embritlement. Corrosion control-galvanization, tinning, anodization and sacrificial anode and impressive current methods. Corrosion penetration rate (CPR) - introduction and numerical problem.

E-waste management: Introduction, sources, types of, effects of e-waste on environment and human health, methods of disposal, advantages of recycling, extraction of copper and gold from e-waste.

Self-Study Components: Recycling of PCB and battery components

MODULE 4: Nano-materials and Display systems **8 Hours**

Nano-materials: Introduction, size dependent properties of nano-materials (Surface area, Catalytic, Conducting), preparation of nano-materials by sol-gel and co-precipitation method with example. Introduction, properties and applications- nano-fibers, nano-photonics, nano-sensors,

Display systems: Liquid crystals - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application in Organic light emitting diodes (OLED's), Quantum Light emitting diodes (QLED's).

Perovskite materials- Introduction, properties and applications in optoelectronic devices

Self-Study Components: Properties and Electrochemical applications of carbon nano-tubes and graphene.

MODULE 5: Electrodes, Sensors in Analytical techniques **8 Hours**

Electrodes: Introduction, types of electrodes, Ion selective electrode – definition, construction,working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode: Introduction, calomel electrode – construction, working and applications of calomel electrode. Electrochemical cell – Definition, classification, construction and applications of Ag_2O-Zn cell. Numerical problems on electrochemical cell.

Sensors: Introduction, working principle and applications of Electrochemical sensors, Thermometric sensors, and Optical sensors

Analytical techniques: Introduction, principle and instrumentation: Colorimetric sensors – estimationof copper, Potentiometric sensors – estimation of iron, Conductometric sensors – estimation of acid mixture.

Self-Study Components: IR and UV- visible spectroscopy.

PRACTICAL MODULE

A – Demonstration (any two) offline/virtual:

A1. Synthesis of poly-aniline and its conductivity measurement.

A2 Synthesis of iron oxide nano-particles by precipitation method.

A3. Determination of COD of industrial waste water

A4. Determination of copper from E-waste (Printed circuit board).

B – Exercise (compulsorily any 3 to be conducted):

B1. Conductometric estimation of acid mixture

B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$

B3. Determination of pKa of vinegar using pH sensor (Glass electrode)

B4. Determination of rate of corrosion of mild steel by weight loss method

C – Structured Enquiry (compulsorily any 3 to be conducted):

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)

C2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)

C3. Estimation of iron in TMT bar by external indicator method

C4. Estimation of **Sodium present in soil/effluent sample** using flame photometer

D – Open Ended Experiments (any two):

D1. Estimation of metal in e-waste by optical sensors.

D2. Electro-less plating of Nickel on Copper

D3. Determination of total hardness of water.

D4. Analysis of constituents present in Portland cement .

Elements of Electrical Engineering

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**P22EEE103/203**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**2:2:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

- To explain the basic laws used in the analysis of DC circuits, electromagnetism.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain three phase circuits, balanced loads and measurement of three phase power.
- To explain the concept of construction and working principle of Electrical Machines and Transformers.
- To explain electricity billing, equipment and personal safety measures.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and talk
2. Animated/NPTEL videos
3. Cut sections
4. PPTs

Module-1 **8 Hours**

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy.

Electromagnetism: Faraday's Laws of Electromagnetic Induction, Lenz's Law, Flemings rules, statically and dynamically induced EMF; concepts of self and mutual inductance. Coefficient of Coupling. Energy stored in magnetic field. Simple Numerical.

Module-2 **8 Hours**

Single-phase AC circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents.

Phasor representation of alternating quantities. Analysis of R-L, R-C and R-L-C circuits with phasor diagrams, Real power, reactive power, apparent power, and Power factor. Series and Parallel circuits. Simple Numerical.

Module-3 **8 Hours**

Three-phase AC circuits: Necessity and advantage of 3-phase system. Generation of 3-phase power. Definition of phase sequence. Balanced supply and balanced load. Relationship between line and phase values of balanced star and delta connections. Power in balanced 3-phase circuits. Measurement of 3-phase power by 2-wattmeter method. Simple Numerical.

Module-4 **8 Hours**

DC & AC Machines: Working principle of DC machine as generator and motor, constructional features, EMF equation of generator, types of armature winding, problems on EMF equation. Back EMF and its significance, types of DC motors, torque equation of DC motor and numerical problems, Applications of DC Motors

Transformer and Synchronous generator:

Construction and working principle of transformer, Construction and working principle of synchronous generator.

Module-5 **8 Hours**

Electricity bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity billfor domestic consumers.

Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.

Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB).

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1	Apply the knowledge of mathematics & electrical laws to solve problems related to electrical circuits.
CO2	Analyze single phase and three phase AC systems to obtain desired expressions.
CO3	Describe the construction and working of DC-AC Machines & transformer
CO4	Explain the concepts of electricity billing, circuit protective devices and personal safety measures.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books:

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and CompanyPublications, 2nd edition, 2015.
3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016.
4. Electrical and electronic measurements and instrumentation by A K Sawhney, Dhanapat Rai and Co. edition, January 2015

Web links and Video Lectures (e-Resources):

- www.nptel.ac.in

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Wherever required, faculty shall demonstrate the concepts through laboratory experiments.

COs and POs Mapping (Individual teacher has to fill up)

Course Articulation Matrix														
Course Outcomes (CO)	**Program Outcomes**													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
Apply the knowledge of mathematics & electrical laws to solve problems related to electrical circuits.	3	-	-	-	-	-	-	-	-	-	-	-	2	-
Analyze single phase and three phase AC systems to obtain desired expressions.	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Describe the construction and working of DC-AC Machines & transformer	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Explain the concepts of electricity billing, circuit protective devices and personal safety measures.	-	3	-	-	-	-	-	-	-	-	-	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

Basic Electronics (For ECE and Allied Branches)
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code:	**P22BEE103/203**	**CIE Marks**	**50**
Course Type (Theory/Practical /Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**3:0:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives: Students will be taught

- Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications.
- Biasing circuits for FET as an amplifier.
- Study of linear Op-amps and its applications.
- Logic circuits and their optimization.
- Principles of Transducers and Communication.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the functioning of various analog and digital circuits.
3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
4. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solvethem.
5. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1 **(8 Hours)**

Semiconductor Diodes: Introduction, Semiconductor diode, Diode equivalent circuits (Text 1: 1.1,1.6,1.9)
Diode Applications: Introduction ,Load Line analysis, , Half Wave Rectification, Full Wave Rectification, Full Wave Rectification, Zener diodes (Text 1: 2.1,2.2,2.6,2.7,2.11)
Power Supplies: Introduction, General Filter Considerations, Capacitor Filter (Text1: 15.1,15.2,15.3)

Module-2 **(8 Hours)**

Bipolar Junction Transistors: Introduction, Transistor construction, Transistor operation (Text 1: 3.1,3.2,3.3)
Field Effect Transistors: Introduction, MOSFETs, Depletion type MOSFETs, Enhancement type MOSFETs , **FET Biasing(only voltage divider method):** Depletion type MOSFET, Enhancement type MOSFET, **FET Amplifiers:** Depletion type MoSFET, Enhancement type MOSFET, E-MOSFET Voltage divider configuration, **Feedback and Oscillator Circuits:** Feedback amplifier- Phase and frequency considerations.
(Text 1: 6.1, 6.7, 6.8,7.7,7.8,8.8,8.9,8.11,14.4)

Module-3 **(8 Hours)**

Operational Amplifiers: Introduction, Op-amp Basics, Practical Op-amp Circuits, Op-amp Specifications- DC offset parameters, Op-amp Specifications- Frequency parameters, Differential and Common –mode operation.
Op-Amp Applications: Constant-Gain multiplier, Voltage summing, Controlled sources, Active Filters
(Text 1: 10.1, 10.4, 10.5,10.6,10.7,10.9,11.1,11.2,11.4,11.6).

Module-4	**(8 Hours)**
Digital Electronics: Introduction, Boolean Algebra Theorems, Digital circuits **Boolean Algebra and Combinational circuits:** Introduction, Binary number system, Octal number system, Hexa Decimal number system, Algebraic simplifications, NAND and NOR implementation. (Text 2:10.1,10.3,10.4,11.1,11.2,11.3,11.4,11.7,11.8)	
Module-5	**(8 Hours)**
Transducers: Introduction, Resistive Transducers, Inductive Transducers, Capacitive Transducers, Thermoelectric transducers, Piezoelectric transducers and Photoelectric transducers(Text 2:15.1,15.3,15.4.1,15.4.2,15.4.3) **Communication Engineering**: Introduction, Elements of Communication systems, Modulation, Transmitter, Digital Communication, The telephone systems, Satellite communication, Principle of operation of mobile phone, Optical fibre communication(Text 2: 18.1,18.2,18.3,18.4,18.6,18.9,18.17,18.18,18.22)	

Course Outcomes: On completion of this course, students are able to:

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Program Outcome Addressed (PO #) with BTL**
CO1	**Apply** the basic knowledge of physics and mathematics to understand the Semiconductor Devices, Op-amps, Transducers and Communication Systems.	Applying	PO1 [L2, L3]
CO2	**Examine** the working of Diodes, Zener diodes, MOSFET, Op-amps, Transducers and Communication Systems.	Analyse	PO2 [L3, L4]
CO3	**Compute** and **implement** the Digital Electronics circuits for the given application using Boolean Algebra theorem and Basic gates.	Applying	PO1,PO2 [L2, L3]
CO4	**Design** a various electronic circuits and Combinational Circuits for the given specifications.	Creating	PO3 [L4, L6],
CO5	**Design** and Simulate the Basic Electronics circuits using modern tools.	Creating	PO5, PO9, P10 [L4, L6]

Course Articulation Matrix (CAM)

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
#1	**3**												**3**	
#2		**3**												**3**
#3	**2**	**3**											**2**	**3**
#4			**2**											
#5					**2**				**2**	**2**				

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Electronic Devices and Circuit Theory, 11th Edition, by Robert L. Boylstad and Louis Nashelsky, PHI,2015,ISBN:978-93-325-4260-0.
2. Basic Electronics, D.P Kothari and I. J Nagarath, McGraw Hill Education, 2014 ISBN: 978-93-329-0158-2

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/122106025
- https://nptel.ac.in/courses/108105132
- https://nptel.ac.in/courses/117104072

Computer-Aided Engineering Drawing

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**P22CED103/203**	**CIE Marks:**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks:**	**50**
		Total Marks:	**100**
Teaching Hours/Week (L:T:P):	**2-0-2**	**Exam Hours:**	**03**
Total teaching hours	**40 hours**	**Credits:**	**03**

Course Learning Objectives: The objectives of this course are to :

- Understand fundamentals of drawing for enhancing imagination and visualization capacity.
- Imparting the knowledge of drafting skills.
- Acquire the knowledge of generating the orthographic projection.
- Acquire the knowledge of generating the isometric projection.
- Use sketching and drawing as communication tool.

Course Content

UNIT-I

Orthographic Projections of Points: Introduction to drawing standards, creation of 2D environment using CAD software, principles of orthographic projections, projections of points in all the four quadrants.

Orthographic Projections of Lines: Projections of straight lines using first angle Projection, true and apparent lengths, true and apparent inclinations with reference planes.

6 Hours

UNIT-II

Orthographic Projections of Plane Surfaces: Triangle, square, rectangle, pentagon, hexagon and circular plates resting on HP in different positions by change of position method only.

8 Hours

UNIT-III

Projections of Solids: Projections of hexahedron, right regular prisms, cylinders, pyramids and cones resting on HP.

10 Hours

UNIT-IV

Isometric Projections: Introduction to i sometric scale, i sometric projection of cube, right regular prisms, pyramids, cylinders, cones, spheres, cut spheres, frustums of cones and pyramids in simple positions, combination of solids (Maximum of two solids).

8 Hours

UNIT-V

Multidisciplinary Applications & Practice (For CIE Only):

Free hand Sketching; True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc

Drawing Simple Mechanisms; Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four-wheeler carts to dimensions etc

Electric Wiring and lighting diagrams; Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software.

Basic Building Drawing; Like, Architectural floor plan, basic foundation drawing, steel structures-Frames, bridges, trusses using CAD software.

Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings, practice on layers concept. **8 Hours**

Text Books

1 **"Engineering Graphics"**, K. R. Gopala Krishna, Subhas Publications Bangalore, 32nd edition, 2005, ISBN:5551234018854.
2 **"Engineering Drawing"**, N.D.Bhatt and V.M.Panchal, Charotar Publishing House, Gujarat, 48th edition, 2005, ISBN:978-93-80358-96-3.

Reference Books

1 **"Computer Aided Engineering Drawing"**, S.Trymbaka Murthy, I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition, 2006, ISBN:9788188237944.
2 **"Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production"**, Luzadder Warren J., Duff John M., Prentice Hall of India Pvt. Ltd., Eastern Economy Edition, 2005, ISBN:9788188237944.

Web Resources

1. https://nptel.ac.in/courses/112103019

Course Outcomes: At the end of the course, students will be able to,

1. **Apply** basics of engineering graphics for enhancing the imagination and visualization skills.
2. **Apply** theory of projection to identify the location and position of an object with respect to the reference planes.
3. **Analyze** the orthographic and isometric projections of an object.
4. **Apply** the basics of computer skills in implementing the principles of engineering graphics to **develop** interdisciplinary engineering components.
5. **Articulate** in lifelong learning using sketching and drawing as **communication** tool.

Course Articulation Matrix

Course Outcomes		Program Outcomes											PSO	
		1	2	3	4	5	6	7	8	9	10	12	1	2
CO1	**Apply** basics of engineering graphics for enhancing the imagination and visualization skills.	3												
CO2	**Apply** theory of projection to identify the location and position of an object with respect to the reference planes.	3												
CO3	**Analyze** the orthographic and isometric projections of an object.		3											
CO4	**Apply** the basics of computer skills in implementing the principles of engineering graphics to **develop** interdisciplinary engineering components.	3		2		3							3	
CO5	**Articulate** in lifelong learning using sketching and drawing as **communication** tool.										3	2		

Introduction to Civil Engineering

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**P22ESC1041/2041**	**CIE Marks:**	**50**
Course Type: (Theory/Practical /Integrated)	**Theory**	**SEE Marks:**	**50**
		Total Marks :	**100**
Teaching Hours/Week (L:T:P:S)	**2:2:0:0**	**Exam Hours:**	**03**
Total Hours of Pedagogy:	**25 hrs. Lecture + 25 hrs. Tutorial = 50 hrs.**	**Credits:**	**03**

Course Learning Objectives: This course will enable the students to:

1. To make students learn the scope of various specializations of civil engineering.
2. To make students learn the concepts of sustainable infrastructure.
3. To develop students' ability to analyze the problems involving forces, moments with their applications.
4. To develop the student's ability to find out the center of gravity and moment of inertia and their applications.
5. To make the students learn about kinematics.

Teaching-Learning Process:

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby sites to give brief information about the Civil Engineering structures.
3. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
4. Encourage collaborative (Group) Learning in the class.
5. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
10. Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1 **10 Hours**

Civil Engineering Disciplines and Building Science

Introduction to Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering,

Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management.

Basic Materials of Construction: Bricks, Cement & mortars, Plain, Reinforced & Pre-stressed Concrete, Structural steel, Construction Chemicals.

Structural elements of a building: Foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase.

Module-2 **10 Hours**

Societal and Global Impact of Infrastructure

Infrastructure: Introduction to sustainable development goals, Smart city concept, clean city 2 concept, Safe city concept

Environment: Importance and necessities for planned water supplies, Need for sanitation, Types of sewerage system, Sources & types of air pollution, Definition and types of Solid waste management.

Built-environment: Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.

Module-3 **10 Hours**

Analysis of force systems: Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, free body diagram, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force systems.

Module-4 **10 Hours**

Centroid: Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples.

Module-5 **10 Hours**

Moment of inertia: Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up sections, Numerical Examples.

Course Outcomes: On completion of this course, students are able to:

Cos	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	***Identify*** the fields of Civil Engineering and its basic materials usage and their functions.	Applying	L3
CO2	***Identify*** the need of infrastructure and environment for societal and global impact.	Applying	L3
CO3	***Solve*** the system of forces by equilibrium conditions.	Applying	L3
CO4	***Identify the*** centroid and moment of inertia of plane and built up sections from first principles.	Applying	L3

Text Book(s):

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB.

Reference Book(s):

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

Web links and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT
2. https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=3
3. https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=6
4. https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=19
5. https://www.youtube.com/watch?v=3YBXteL-qY4
6. https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=11
7. https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=8
8. https://www.youtube.com/watch?v=atoP5_DeTPE
9. https://www.youtube.com/watch?v=ksmsp9OzAsI
10. https://www.youtube.com/watch?v=x1ef048b3CE
11. https://www.youtube.com/watch?v=l_Nck-X49qc
12. https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force&pli=1
13. https://www.youtube.com/watch?v=RIBeeW1DSZg
14. https://www.youtube.com/watch?v=R8wKV0UQtlo
15. https://www.youtube.com/watch?v=0RZHHgL8m_A
16. https://www.youtube.com/watch?v=Bls5KnQOWkY

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning:

1. https://www.youtube.com/watch?v=Zrc_gB1YYS0
2. https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc
3. https://www.youtube.com/watch?v=Hn_iozUo9m4
4. https://play.google.com/store/apps/details?id=com.teobou
5. https://www.youtube.com/watch?v=WOHRp3V-QA0

Course Articulation Matrix (CAM)

Sl. No	Course Outcome – CO	Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	***Identify*** the fields of Civil Engineering and its basic materials usage and their functions.	1					1							1		
2	***Identify*** the need of infrastructure and environment for societal and global impact.						1	1						1	1	
3	***Solve*** the system of forces by equilibrium conditions.	2	2											1	1	
4	***Identify*** the centroid and moment of inertia of plane and built up sections from first principles.	2	2											1		
3- Highly Mapped, **2**-Moderately Mapped, 1-Low Mapped, 0- Not Mapped																

Introduction to Electrical Engineering

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**P22ESC1042/2042**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**3:0:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

- To explain the laws used in the analysis of DC and AC circuits.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain the construction and operation of transformers, DC generators and motors and inductionmotors.
- To introduce concepts of circuit protecting devices and earthing.
- To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and talk
2. Animated/NPTEL videos
3. Cut sections
4. PPTs

Module-1 **8 Hours**

Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.

Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach).

DC Circuits:

Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits.

Simple Numerical.

Module-2 **8 Hours**

A.C. Fundamentals:

Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions)

Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance. Analysis of R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical).

Module-3 **8 Hours**

DC Machines:

DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical.

DC Motor: Principle of operation, back emf and its significance.Torque equation, types of motors, applications of DC motors. Simple numerical.

Module-4 **8 Hours**

Transformers: Necessity of transformer, principle of operation, Types and construction of single- phase transformers, EMF equation, losses, efficiency and simple numerical.

Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.

Module-5 **8 Hours**

Domestic Wiring: Two way and three way control of load.

Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops,printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.

Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1	Apply the knowledge of mathematics & electrical laws to solve problems related to electrical circuits.
CO2	Analyze single phase and three phase AC systems to obtain desired expressions.
CO3	Describe the construction and working of different Electrical Machines and transformers
CO4	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures and green energy sources

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)Text Books:

1. Basic Electrical Engineering byD C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and CompanyPublications, 2nd edition, 2015.
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition,2014.

Web links and Video Lectures (e-Resources):

- www.nptel.ac.in

COs and POs Mapping (Individual teacher has to fill up)

Course Articulation Matrix														
Course Outcomes (CO)	**Program Outcomes**													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Apply the knowledge of mathematics & electrical laws to solve problems related to electrical circuits.	3	-	-	-	-	-	-	-	-	-	-	-	2	-
Analyze single phase and three phase AC systems to obtain desired expressions.	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Describe the construction and working of different Electrical Machines and transformers.	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Explain the concepts of electricity billing, circuit protective devices and personal safety measures.	-	3	-	-	-	-	-	-	-	-	-	-	-	2

Introduction to Electronics Engineering

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**P22ESC1043/2043**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**3:0:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
2. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.
3. Professionalism & Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social
4. Context, and life-long learning needed for a successful professional career.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby PSUs such as BHEL, BEL, ISRO, etc., and small-scale hardware Industries to give brief information about the electronics manufacturing industry.
3. Show Video/animation films to explain the functioning of various analog and digital circuits.
4. Encourage collaborative (Group) Learning in the class
5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1	**8 hours**
Diode Applications: Half-wave rectification, Full-wave rectification, Zener diodes, Voltage multiplier circuits **Power Supplies:** Introduction, General filter considerations, Capacitor filter **Field Effect Transistors:** Introduction, Depletion-type MOSFET, Enhancement-type MOSFET (Text 1:2.6,2.7,2.11,15.1,15.2,15.3,6.1,6.7,6.8,)	
Module-2	**8 hours**
Feedback and Oscillator Circuits: Feedback Concepts, Oscillator Operation, Phase-shift Oscillator, Wein bridge oscillator, Crystal Oscillators. **Operational amplifiers** – Introduction, Op-amp Basics, Practical opamp circuits, Constant gain Multiplier(Text 1: 14.1,14.5,14.6,14.7,14.9,10.1,10.4,10.5,11.1)	
Module-3	**8 hours**
Boolean Algebra and Combinational Circuits: Introduction, Binary number system, Octal number system, Hexadecimal number system, Digital circuits, Boolean algebra theorems, Algebraic simplification, NAND and NOR Implementation (Text 2: 11.1,11.2,11.3,11.4,10.4,10.3,11.7,11.8)	
Module-4	**8 hours**
Introduction to Embedded Systems: What is an Embedded system, Embedded systems vs general computing systems, History of Embedded systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Purpose of Embedded Systems, Core of the Embedded System, Memory(Text 3: 1.1,1.2,1.3,1.4,1.5,1.6,2.1,2.2)	
Module-5	**8 hours**
Communication Engineering: Introduction, Elements of Communication Systems, Modulation, Transmitter, Automatic Gain control circuit, Digital communication, Multiplexing, Pulse Demodulation, The telephone systems, Data Transmission, Digital modulation, Multiplexing and Multi-Acess, Transmission lines, Radio waves, Antennas, Television, Satellite Communication, Principle of Operation of Mobile phone, FAX, ISDN, Microwave communication, Optical fibre Communication. (Text2:18.1,18.2,18.3,18.4,18.5,18.6,18.7,18.8,18.9,18.10,18.11,18.12,18.13,18.14,18.15,18.16,18.17,18.18,18.19,18.20,18.21,18.22)	

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

A. CO v/s PO Mapping Table

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Program Outcome Addressed (PO #) with BTL**
CO1	**Understand** the basic concepts of various Electronic components and circuits, Digital circuits, embedded systems and communication systems.	Understand	
CO2	**Apply** the basic knowledge of mathematics, science to understand the Construction of Devices, logic principles to simplify Boolean expressions.	Applying	PO1 [L2]

CO3	**Analyse** the working of Electronic devices/circuits and Digital circuits, concepts of embedded systems, concepts of communication engineering.	Analyse	PO2 [L2, L3]
CO4	**Design** a various electronic circuits, combinational circuits for the given specifications.	Creating	PO3 [L4],

Course Articulation Matrix (CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
#1														
#2	**3**												**3**	
#3		**3**												**3**
#4			**2**											

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Electronic Devices and Circuit Theory, 11th Edition, byRobert L. Boylstad and Louis Nashelsky, PHI, 2015,ISBN:978-93-325-4260-0.
2. Basic Electronics, D.P Kothari and I. J Nagarath, McGraw Hill Education, 2014, ISBN: 978-93-329-0158-2
3. Introduction to Embedded Systems, Shibhu K V,McGraw Hill Education,2011, ISBN: 978-0-07-014589-4

Introduction to Mechanical Engineering
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code:	**P22ESC1044/2044**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**3:0:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course Learning Objectives: The objectives of this course are,

- To develop fundamental knowledge of Mechanical Engineering and Energy Sources.
- To understand the concept of Modern Manufacturing Processes like CNC and 3D printing.
- To understand the working concepts of IC engines and Electric Vehicles.
- To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications.
- To acquire a basic knowledge of Robotics and Automation in industrial applications.

Course Content

UNIT-I

Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace and Marine sectors.

Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind and bio-fuels, Environmental issues like Global warming and Ozone depletion.

8 Hours

UNIT-II

Mechanical and Electrical Drives: Mechanical Drives: Classification of IC Engines, Working Principles of 4-Strokes Petrol and Diesel Engines, Application of IC Engines.

Electrical Drives: History, components of electric vehicles, Basic structure of electric vehicle, EV/ICE comparison, Concept of Hybrid Electric Drive Trains, Classification of hybrid electric vehicles.

Classification of gears, velocity ratio for simple and compound gear trains.

8 Hours

UNIT-III

Engineering Materials: Types and applications of Ferrous and Nonferrous Metals, silica, ceramics, glass, graphite, diamond, polymer and Shape Memory Alloys.

Joining Processes: Soldering, Brazing and Welding, definitions, classification of welding process, Arc welding, Gas welding and types of flames.

8 Hours

UNIT-IV

Machine Tool Operations: Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of Drilling Machine, drilling operations: drilling, boring, reaming. Working principle of Milling Machine, Milling operations: plane milling and slot milling (No sketches of machine tools, sketches to be used only for explaining the operations).

Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing and its applications.

8 Hours

UNIT-V

Introduction to Mechatronics and Robotics: Open-loop and Closed-loop mechatronic systems. Classification based on robotics configuration: Polar, Cylindrical, Cartesian coordinate, Jointed arm and SCARA, advantages, limitations and applications.

Automation in Industry: Definition, types – Fixed, flexible and programmable automation, basic elements with block diagrams and advantages.

Introduction to Internet of Things (IoT): Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks and communication models.

8 Hours

Text Books

1. K. R. Gopalakrishna, "**Elements of Mechanical Engineering**", Subhash Publishers, Bangalore, 2018, ISBN:978-93-8681-924-6.
2. Jonathan Wickert and Kemper Lewis, "**An Introduction to Mechanical Engineering**", Third Edition, 2012, ISBN-13: 978-1-111-57680-6.

Reference Books

1. R K Rajput, "**Material Science and Engineering**", S. K. Kataria and Sons-New Delhi, 2013, ISBN:108185749108.
2. Mikell P Grover, "**Automation, Production Systems and Computer Integrated Manufacturing**", Prentice hall of India Pvt. Ltd, 2002, ISBN:1292076119.
3. MehrdadEhsani, YiminGao, Sebastien E. Gay and Li Emadi, "**Modern Electric, Hybrid Electric and Fuel Cell Vehicles**", CRC Press LLC, 2005, ISBN:10-8493-3154-4.
4. Raj kamal, " **Internet of Things: Architecture and Design**", McGraw hill, ISBN:9352605225.

Web Resources

1. https://nptel.ac.in/courses/116/102/116102012/
2. https://www.youtube.com/watch?v=Zgp86PVXXuQ
3. https://nptel.ac.in/courses/112/105/112105211/
4. https://nptel.ac.in/courses/112/105/112105249/
5. https://nptel.ac.in/courses/112/107/112107213

Course Outcomes: At the end of the course, students will be able to,

1. **Apply** the fundamentals of mechanical engineering in the operational features of mechanical systems used in engineering practices.
2. **Identify** the different sources of energy and energy conversion in IC Engines and Electric Vehicles.
3. **Apply** the knowledge of engineering material properties and metal joining processes in engineering industrial applications.
4. **Apply** the knowledge of traditional and advanced manufacturing processes in mechanical engineering.

Course Articulation Matrix

Course Outcomes		Program Outcomes												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	**Apply** the fundamentals of mechanical engineering in the operational features of mechanical systems used in engineering practices.	3												1	
CO2	**Identify** the different sources of energy and energy conversion in IC Engines and Electric Vehicles.	3													1

CO3	**Apply** the knowledge of engineering material properties and metal joining processes in engineering industrial applications.	3												1	
CO4	**Apply** the knowledge of traditional and advanced manufacturing processes in mechanical engineering.	3													1

SEE- Course Assessment Plan

COs	**Marks Distribution**					**Total Marks**	**Weightage (%)**
	Unit I	**Unit II**	**Unit III**	**Unit IV**	**Unit V**		
CO1	2+9	9			9	29	29%
CO2	9	2+9				20	20%
CO3			2+9+9			20	20%
CO4				2+9+9	2+9	31	31%
	20	20	20	20	20	100	100%
Application = 100%							

Introduction to C Programming
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code:	**P22ESC1045/2045**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**3:0:0:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

CLO 1. Elucidate the basic architecture and functionalities of a Computer
CLO 2. Apply programming constructs of C language to solve the real-world problems
CLO 3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems
CLO 4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures

Teaching-Learning Process(General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) need not to be only traditional lecture method, but alternative effective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop design thinking skills such as the ability to design, evaluate, generalize, and analyze information rather thansimply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world-and when that's possible, it helps to improve the students' understanding.
9. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the operations of C Programs

Module-1 **(6 Hours of Pedagogy)**

Introduction to C: Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C,

Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 – 8.6, 9.1-9.14

Teaching-Learning Process	Chalk and talk method/Power Point Presentation

Module-2 **(6 Hours of Pedagogy)**

Operators in C, Type conversion and typecasting.

Decision control and Looping statements: Introduction to decision control, Conditional branching statements,iterative statements, nested loops, break and continue statements, go to statement.

Textbook: Chapter 9.15-9.16, 10.1-10.6

Teaching-Learning Process	Chalk and talk method/Power Point Presentation

Module-3 **(6 Hours of Pedagogy)**

Functions: Introduction using functions, Function definition, function declaration, function call, return statement,passing parameters to functions, scope of variables, storage classes, recursive functions.

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays,Passing arrays to functions.

Textbook: Chapter 11.1-11.13, 12.1-12.6

Teaching-Learning Process	Chalk and talk method/Power Point Presentation

Module-4 **(6 Hours of Pedagogy)**

Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensionalarrays.

Applications of arrays and introduction to strings: Applications of arrays, case study with sorting techniques.

Introduction to strings: Reading strings, writing strings, summary of functions used to read and write characters.Suppressing input using a Scan set.

Textbook: Chapter 12.7-12.12

Teaching-Learning Process	Chalk and talk method/Power Point Presentation

Module-5 **(6 Hours of Pedagogy)**

Strings: String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings.

Pointers: Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables

Structures: Introduction to structures

Textbook: Chapter 13.1-13.6, 14.1-14.3,15.1

Teaching-Learning Process	Chalk and talk method/Power Point Presentation

Course Outcomes(Course Skill Set)

At the end of the course the student will be able to:

CO1. Elucidate the basic architecture and functionalities of a computer and also recognizethe hardware parts.

CO2. Apply programming constructs of C language to solve the real world problemCO 3.Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting

CO4. Explore user-defined data structures like structures, unions and pointers inimplementing solutions

CO5. Design and Develop Solutions to problems using modular programming constructsusing functions

Suggested Learning Resources:

Textbooks

1. Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition, 2017.

Reference Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.

2. Brian W. Kernighan and Dennis M. Ritchie, the 'C' Programming Language, Prentice Hall of India.

Web links and Video Lectures (e-Resources):

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/ MOOC courses can be adopted for more clarity inunderstanding the topics and verities of problem solving methods.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars

Lab Assignments	
1	C Program to find Mechanical Energy of a particle using E = mgh+1/2 mv2.
2	C Program to convert Kilometers into Meters and Centimeters.
3	C Program To Check the Given Character is Lowercase or Uppercase or Special Character.
4	Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of thetype: The task is to find the values of constants b_1, b_2, b_3 such that the equation is balanced on both sides and it must be the reduced form.
5	Implement Matrix multiplication and validate the rules of multiplication.
6	Compute sin(x)/cos(x) using Taylor series approximation. Compare you result with the built-inlibrary function. Print both the results with appropriate inferences.
7	Sort the given set of N numbers using Bubble sort.
8	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.
9	Implement structures to read, write and compute average-marks and the students scoring aboveand below the average marks for a class of N students.
10	Develop a program using pointers to compute the sum, mean and standard deviation of allelements stored in an array of N real numbers.

COs and POs Mapping

COs	POs											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3											
CO2	2	1	1		2							
CO3	2	1	1		2							
CO4	2	1	1		2							

Renewable Energy Sources

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**P22ETC1054/2054**	**Credits:**	**03**
Teaching Hours/Week (L:T:P:S)	**3:0:0:0**	**CIE Marks:**	**50**
Total Hours of Pedagogy:	**40 Hours**	**SEE Marks:**	**50**

Course Learning Objectives: This course will enable the students to:

1) To understand energy scenario, energy sources and their utilization.
2) To explore society's present needs and future energy demands.
3) To Study the principles of renewable energy conversion systems.
4) To exposed to energy conservation methods.

Teaching-Learning Process:

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective.

1) Use pie chart showing distribution of renewable energy sources.
2) Use wind turbine models.
3) Use sun path diagrams

Module-1 **(08 hours)**

Introduction: Principles of renewable energy; energy and sustainable development, fundamentals and social implications. worldwide renewable energy availability, renewable energy availability in India, brief descriptions on solar energy, wind energy, tidal energy, wave energy, ocean thermal energy, biomass energy, geothermal energy, oil shale. Introduction to Internet of energy (IOE).

Module-2 **(08 hours)**

Solar Energy: Fundamentals; Solar Radiation; Estimation of solar radiation on horizontal and inclined surfaces; Solar radiation Measurements- Pyrheliometers, Pyrometer, Sunshine Recorder. Solar Thermal systems: Flat plate collector; Solar distillation; Solar pond electric power plant.
Solar electric power generation: Principle of Solar cell, Photovoltaic system for electric power generation, advantages, Disadvantages and applications of solar photovoltaic system.

Module-3 **(08 hours)**

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Basic components of wind energy conversion system (WECS); Classification of WECS- Horizontal axis- single, double and muliblade system. Vertical axis- Savonius and darrieus types.

Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies -fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft).

Module-4 **(08 hours)**

Tidal Power: Tides and waves as energy suppliers and their mechanics; fundamental characteristics of tidal power, harnessing tidal energy, advantages and limitations.
Ocean Thermal Energy Conversion: Principle of working, OTEC power stations in the world, problems associated with OTEC.

Module-5			**(08 hours)**
Green Energy: Introduction, Fuel cells: Classification of fuel cells – H2; Operating principles, Zero energy Concepts. Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy.			
Course Outcomes: On completion of this course, students are able to:			
COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Level Indicator**
CO1	***Apply*** the basics and thereby to acquire knowledge about renewable resources like Solar, Wind, Tidal etc	Understanding	L2
CO2	***Explain*** the environmental aspects of renewable energy resources in Comparison with various conventional energy systems, their prospects and limitations.	Applying	L3
CO3	***Identify*** to get adequate inputs on a variety of issues in harnessing renewable energy	Understanding	L2
CO4	***Identify*** the various renewable energy resources like Solar, Wind, Tidal etc and their applications.	Applying	L3

Text Book(s):

1. Non conventional Energy sources, G D Rai, Khanna Publication, Fourth Edition.
2. Energy Technology, S. Rao and Dr. B.B. Parulekar, Khanna Publication.
3. Solar energy, Subhas P Sukhatme, Tata McGraw Hill, second Edition, 1996.

Reference Book(s):

1. Principles of Energy conversion, A. W. Culp Jr.,, McGraw Hill, 1996
2. Non-Convention EnergyResources, Shobh Nath Singh, Pearson, 2018.

Web links and Video Lectures (e-Resources):

1. E-book URL: https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html
2. E-book URL:https://www.pdfdrive.com/non-conventional-energy-systems-nptel-d17376903.html
3. E-book URL: https://www.pdfdrive.com/renewable-energy-sources-and-their-applications-e33423592.html
4. E-book URL: https://www.pdfdrive.com/lecture-notes-on-renewable-energy-sources-e34339149.html
5. https://onlinecourses.nptel.ac.in/noc18_ge09/preview

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning:

1) Poster presentation on the theme of renewable energy sources.
2) Industry Visit.

Course Articulation Matrix (CAM)

Sl. No	Course Outcome – CO	Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
01	***Apply*** the basics and thereby to acquire knowledge about renewable resources like Solar, Wind, Tidal etc	1	1				1							1	1	
02	***Explain*** the environmental aspects of renewable energy resources in Comparison with various conventional energy systems, their prospects and limitations.		1		1		1							1	1	
03	***Identify*** to get adequate inputs on a variety of issues in harnessing renewable energy		1				1	1						1	1	
04	***Identify*** the various renewable energy resources like Solar, Wind, Tidal etc and their applications.			1			1	1						1	1	
3- Highly Mapped, **2**-Moderately Mapped, 1-Low Mapped, 0- Not Mapped																

Introduction to Internet of Things(IOT)
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code:	**P22ETC1055/2055**	**CIE Marks:**	**50**
Course Type (Theory/Practical/Integrated):	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**3-0-0-0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

1. Understand about the fundamentals of Internet of Things and its building blocks along with theircharacteristics.
2. Understand the recent application domains of IOT in everyday life.
3. Gain insights about the current trends of Associated IOT technologies and IOT Analytics.

Teaching-Learning Process

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) needs not to be only a traditional lecture method, but alternativeeffective teaching methods could be adopted to attain the outcomes.
2. Use of Video/Animation to explain functioning of various concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOT (Higher order Thinking) questions in the class, which promotescritical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, developdesign thinking skills such as the ability to design, evaluate, generalize, and analyze information rather than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic andencourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, ithelps improve the students' understanding.
9. Use any of these methods: Chalk and board, Active Learning, Case Studies

Module-1 **8 hours**

Basics of Networking: Introduction, Network Types, Layered network models

Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence ofTechnologies, IoT Networking Components

Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4

Module-2 **8 hours**

IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.
Textbook 1: Chapter 5 – 5.1 to 5.9

Module-3	**8 hours**
IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. Textbook 1: Chapter 6 – 6.1 to 6.5	
Module-4	**8 hours**
Associated IoT Technologies: Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. **IoT Case Studies** Agricultural IoT – Introduction and Case Studies Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2	
Module-5	**8 hours**
IoT Case Studies and Future Trends: Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics – Introduction Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1	

Course outcome (Course Skill Set) :

At the end of the course the student will be able to:

CO1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IOT.
CO2	Classify various sensing devices and actuator types.
CO3	Demonstrate the processing in IOT.
CO4	Explain Associated IOT Technologies
CO5	Illustrate architecture of IOT Applications

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.

Reference:

1. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRCPress.
2. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning:

- Demonstrate a sensor based application

COs and POs Mapping:

Cos	POs												PSOs		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	1	1	-	-	-	-	-	-	-	-	-	1	-	-	1
CO2	1	2	-	-	-	-	-	-	-	-	-	1	-	-	1
CO3	1	2	-	-	-	-	-	-	-	-	-	1	-	-	1
CO4	1	1	-	-	-	-	-	-	-	-	-	1	-	-	1
CO5	1	2	-	-	-	-	-	-	-	-	-	1	-	-	1

Smart Materials and Systems

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**P22ETC1056/2056**	**CIE Marks:**	**50**
Course Type (Theory/Practical/Integrated):	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**3-0-0-0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course Learning Objectives: The objectives of this course are,

- To study various types of smart materials used in engineering application.
- To study processing of smart materials.
- To study the basic working principles of sensors and actuators in engineering application.

Course Content

UNIT-I

Introduction: Characteristics of metals, polymers and ceramics. Introduction to smart materials, Classification of smart materials, Components of a smart System: Sensors, actuators and transducers. Advantages, Limitations and Applications of smart materials.

8 Hours

UNIT-II

Electro-rheological and Magneto-rheological Fluids: Mechanisms, Characteristics, Fluid composition and Behavior, Discovery and Early developments, Applications of Electro-rheological and Magneto-rheological fluids.

8 Hours

UNIT-III

Processing of Smart Materials: Introduction to Semiconductors and their processing, Metals and metallization techniques, Ceramics and their processing, Polymers and their synthesis, UV radiation curing of polymers.

8 Hours

UNIT-IV

Sensors: Working principles of Conductometric sensors, Capacitive sensors, Piezoelectric sensors, Magnetostrictive sensors, Piezo-resistive sensors, Optical sensors, Resonant sensors, semiconductor-based sensors, Acoustic sensors, polymerize sensors and Carbon nanotube sensors.

8 Hours

UNIT-V

Actuators: Working principles of Electrostatic transducers, Electromagnetic transducers, Electrodynamic transducers, Piezoelectric transducers, Electrostrictive transducers, Magnetostrictive transducers, Electro thermal actuators, Comparison of actuation and Applications.

8 Hours

Text Books

1. V. K. Varadan, K. J. Vinoy, S. Gopalakrishnan, **"Smart Material Systems and MEMS: Design and Development Methodologies"**, John Wiley and Sons, Oct 2006, ISBN: 978-0-470-09361-0.
2. Brain Culshaw, **"Smart Structures and Materials"**, Artech House, London, Sep 2004, ISBN: 9780890066812.
3. Mukesh V. Gandhi, Brian S. Thompson, **"Smart Materials and Structures"**, Springer, May1992, ISBN: 9780412370106.

Reference Books

1. A. V. Srinivasan, **"Smart Structures: Analysis and Design"**, Cambridge University Press, Cambridge, New York, 2001, ISBN: 978-0521659772.
2. P. Gauenzi, **"Smart Structures"**, Wiley, Oct 2009, ISBN: 978-0-470-68243-2.
3. G. Gautschi, **"Piezoelectric Sensorics: Force, Strain, Pressure, Acceleration and Acoustic Emission Sensors, Materials and Amplifiers"**, Springer, Berlin, New York, 2002, ISBN: 978-3-662-04732-3.

Web Resources

6. https://nptel.ac.in/courses/112104173/
7. https://nptel.ac.in/courses/112104173/
8. https://nptel.ac.in/courses/112104251/
9. www.iop.org/EJ/article/0964-1726/5/3/002/sm6301.ps.gz

Course Outcomes: At the end of the course, students will be able to,

1. **Apply** the fundamental characteristics of metals, polymers, ceramics and shape memory alloys in different engineering applications.
2. **Apply** the knowledge of fluid characteristics in analysing the behavior of electro-rheological and magneto-rheological fluids.
3. **Identify** the different sensors and actuators used in engineering applications.
4. **Apply** the knowledge of various processing techniques and basic applications of smart materials in developing components of smart system.

Course Articulation Matrix

Course Outcomes		Program Outcomes												PSO	
		1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	**Apply** the fundamental characteristics of metals, polymers, ceramics and shape memory alloys in different engineering applications.	3													
CO2	**Apply** the knowledge of fluid characteristics in **analysing** the behavior of electro-rheological and magneto-rheological fluids.	3	1											1	
CO3	**Identify** the different sensors and actuators used in engineering applications.	3												1	
CO4	**Apply** the knowledge of various processing techniques and basic applications of smart materials in developing components of smart system.	3													1

SEE- Course Assessment Plan

COs	Marks Distribution					Total Marks	Weightage (%)
	Unit I	Unit II	Unit III	Unit IV	Unit V		
CO1	2+9		9			20	20%
CO2		2+9			9	20	20%
CO3		9		2+9	2+9	31	31%
CO4	9		2+9	9		29	29%
	20	20	20	20	20	100	100%

Application =80% Analysis = 20%

Introduction to Cyber Security

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**22ETC1057/2057**	**CIE Marks**	**50**
Course Type (Theory/Practical /Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**3-0-0-0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

- To familiarize cybercrime terminologies and perspectives
- To understand Cyber Offenses and Botnets
- To gain knowledge on tools and methods used in cybercrimes
- To understand phishing and computer forensics

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and Board
2. Demonstration
3. Interactive learning
4. Videos and online material

Module-1 **(8 hours of pedagogy)**

Introduction to Cybercrime:

Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws., Global Perspectives

Textbook:1 Chapter 1 (1.1 to 1.5, 1.7-1.9)

Module-2 **(8 hours of pedagogy)**

Cyber Offenses:

How Criminals Plan Them: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercaafe & cybercrimes.

Botnets: The fuel for cybercrime, Attack Vector.Textbook:1 Chapter 2 (2.1 to 2.7)

Module-3 **(8 hours of pedagogy)**

Tools and Methods used in Cybercrime: Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyways, Virus and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attackes, Attacks on Wireless networks.
Textbook:1 Chapter 4 (4.1 to 4.9, 4.12)

Module-4 **(8 hours of pedagogy)**

Phishing and Identity Theft: Introduction, methods of phishing, phishing,phising techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft
Textbook:1 Chapter 5 (5.1. to 5.3)

Module-5	**(8 hours of pedagogy)**
Understnading Computer Forensics: Introdcution, Historical Background of Cyberforensics, Digital Foresics Science, Need for Computer Foresics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics. Textbook:1 Chapter 7 (7.1. to 7.5, 7.7 to 7.9)	

Course Outcomes: On completion of this course, students are able to:

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Program Outcome Addressed (PO #) with BTL**
CO1	Understand Fundamental Cyber security	L2	PO1(L2)
CO2	Analyze Cyber Threats and Risks	L4	PO3 (L4)
CO3	Interpret Security in Software and Networks	L2	PO2 (L2)
CO4	Demonstrate Awareness of Emerging Cyber security Trends	L2	PO4(L2)

Course outcome (Course Skill Set)

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvmNQjS_rt9swsu
- https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_
- https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaeekrhGzJlB8XQBxU3zhDwT95xlk
- https://www.youtube.com/watch?v=KqSqyKwVuA8

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Illustration of standard case study of cyber crime
- Setup a cyber court at Institute level

Course Articulation Matrix (CAM)														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
#1	3													
#2			2											
#3		2												
#4				2					1	1				

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped

Introduction to Web Programming
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code:	**P22PLC1051/2051**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Integrated**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**2:0:2:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

1. To use the syntax and semantics of HTML and XHTML
2. To develop different parts of a web page
3. To understand how CSS can enhance the design of a webpage.
4. To create and apply CSS styling to a webpage
5. To get familiarity with the JavaScript language and understand Document Object Model handling of Java Script

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomesand make Teaching –Learning more effective

1. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the operations of Java scripts
2. Chalk and talk
3. Online demonstration
4. Hands on problem solving

Module-1 **8 hours**

Module-1:Traditional HTML and XHTML:

First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History, HTML and XHTML DTDs: The Specifications Up Close, (X) HTML Document Structure, Browsers and (X) HTML, The Rules of (X)HTML, Major Themes of (X)HTML, The Future of Markup—Two Paths?

TextBook1: Chapter 1

Module-2 **8 hours**

Module-2: HTML5:

Hello HTML5, Loose Syntax Returns, XHTML5, HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics, HTML5's Open Media Effort, Client-Side Graphics with <canvas>, HTML5 Form Changes, Emerging Elements and Attributes to Support Web Applications

TextBook1: Chapter 2

Module-3	**8 hours**

Module-3: Cascading Style Sheets (CSS)

Introduction, CSS Overview , CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, styleAttribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color, Font Properties, line-height
Property, Text Properties, Border Properties, Element Box, padding Property, margin Property.
Case Study: Description of a Small City's Core Area.

TextBook2-: Chapter 3

Module-4	**8 hours**

Module-4: Tables and CSS, Links and Images

Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo-Class Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, a Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element .

TextBook2: 5.2 to 5.8, 6.2, 6.3, 6.6., 6.7, 6.9, 6.10, 6.12, 7.2 to 7.4

Module-5	**8 hours**

Module-5: Introduction to JavaScript: Functions, DOM, Forms, and Event Handlers

History of JavaScript, Hello World Web Page, Buttons, Functions, Variables, Identifiers, Assignment Statements and Objects, Document Object Model, Forms and How They're Processed: Client-Side Versus Server-Side, form Element, Controls, Text Control, Accessing a Form's Control Values, reset and focus Methods

TextBook2: 8.2 to 8,13, 8.15, 8.16

Course outcome (Course Skill Set)
At the end of the course the student will be able to:

CO1	Explain the historical context and justification for HTML over XHTML
CO2	Develop HTML5 documents and adding various semantic markup tags
CO3	Analyze various attributes, values and types of CSS
CO4	Implement core constructs and event handling mechanisms of JavaScript.

Programming Assignments:

1. Create an XHTML page using tags to accomplish the following:
   (i) A paragraph containing text "All that glitters is not gold". Bold face and italicize this text
   (ii) Create equation:

$$\square = 1/3(\square_1^2 + \square_1^2$$

   (iii) Put a background image to a page and demonstrate all attributes of background image
   Create unordered list of 5 fruits and ordered list of 3 flowers

2. Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary

<table>
<tr><td rowspan="9">Department</td><td rowspan="3">Sem1</td><td>SubjectA</td></tr>
<tr><td>SubjectB</td></tr>
<tr><td>SubjectC</td></tr>
<tr><td rowspan="3">Sem2</td><td>SubjectE</td></tr>
<tr><td>SubjectF</td></tr>
<tr><td>SubjectG</td></tr>
<tr><td rowspan="3">Sem3</td><td>SubjectH</td></tr>
<tr><td>SubjectI</td></tr>
<tr><td>SubjectJ</td></tr>
</table>

3. Use HTML5 for performing following tasks:
   I. Draw a square using HTML5 SVG , fill the square with green color and make 6px brown stroke width
   II. Write the following mathematical expression by using HTML5 MathML.
   $d=x^2-y^2$
   III. Redirecting current page to another page after 5 seconds using HTML5 metatag
4. Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives informationabout travel experience.

5. Create a class called **income**, and make it a background color of #0ff. Create a class called **expenses**, and make it a background color of #f0f. Create a class called **profit**, and make it a background color of #f00.

   Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text. Further create following line of text in the same document:

   ~~The current price is 50₹~~ and new price is 40₹

6. Change the tag **li** to have the following properties:
   - A display status of inline

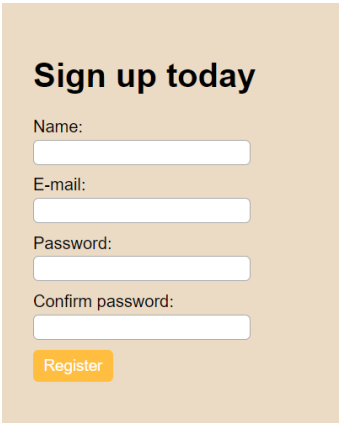
- A medium, double-lined, black border
- No list style type

Add the following properties to the style for **li**:

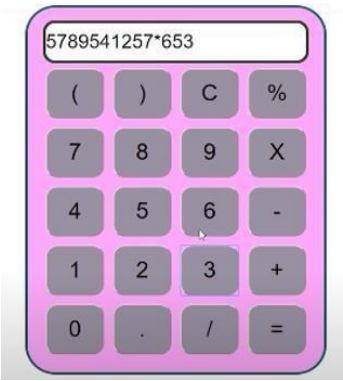
- Margin of 5px
- Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px tothe left

Also demonstrate list style type with user defined image logos

7. Create following web page using HTML and CSS with tabular layout



8. Create following calculator interface with HTML and CSS



9. Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay

10. Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

TextBook-1: HTML & CSS: The Complete Reference Thomas A. Powell, , Fifth Edition, Tata McGraw Hill

TextBook-2: WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones &Bartlett

Learning, First Edition

Web links and Video Lectures (e-Resources):

https://onlinecourses.swayam2.ac.in/aic20_sp11/preview

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Develop simple GUI interfaces for a computer program to interact with users

COs and POs Mapping :

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

Introduction to Python Programming
[As per Choice Based Credit System (CBCS) & OBE Scheme]
SEMESTER – I/II

Course Code:	**P22PLC1052/2052**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Integrated**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**2:0:2:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

- Learn the syntax and semantics of the Python programming language.
- Illustrate the process of structuring the data using lists, tuples
- Appraise the need for working with various documents like Excel, PDF, Word and Others.
- Demonstrate the use of built-in functions to navigate the file system.
- Implement the Object Oriented Programming concepts in Python.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the python code
2. Demonstrate and visualize basic data types (list, tuple, and dictionary).
3. Chalk and talk
4. online and videos

Module-1 **8 Hours**

Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, **Flow control:** Boolean Values, Comparison Operators, and Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys. exit()

Functions: def. Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number

Textbook 1: Chapters 1 – 3

Module-2 **8 Hours**

Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References.

Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Using DataStructures to Model Real-World Things,

Textbook 1: Chapters 4 – 5

Module-3	**8 Hours**
Manipulating Strings: Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup **Reading and Writing Files:** Files and File Paths, The OS .path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the print. format() Function, Project: Generating Random Quiz Files, Project: Multi clip board, **Textbook 1: Chapters 6 , 8**	
Module-4	**8 Hours**
Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zip file Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File, **Debugging:** Raising Exceptions, Getting the Trackback as a String, Assertions, Logging, IDLE‟s Debugger. **Textbook 1: Chapters 9-10**	
Module-5	**8 Hours**
Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying, **Classes and functions:** Time, Pure functions, Modifiers, Prototyping versus planning, **Classes and methods:** Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The str method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation, **Textbook 2: Chapters 15 – 17**	

Course Outcomes: On completion of this course, students are able to:

COs	**Course Outcomes** with ***Action verbs*** for the Course topics	**Bloom's Taxonomy Level**	**Program Outcome Addressed (PO #)**	
CO1	**Understand** the concepts of python programming	L2	PO1	PO5 (L2)
CO2	**Apply** the knowledge of programming to write the flowcharts and programs to solve engineering problems.	L3	PO1	
CO3	**Analyze** and implement programming solutions using key programming concepts	L4	PO2	
CO4	**Develop** programming solutions to contrast different data handling methods.	L5	PO3 PO12	
CO5	**Demonstrate** the concepts of object-oriented programming (OOP) to solve real-world problems	L2	PO9	

Programming Exercises:

1. a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Displaythe student details, total marks and percentage with suitable messages.
   b. Develop a program to read the name and year of birth of a person. Display whether the person is asenior citizen or not.

2. a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
   b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).

3. Read N numbers from the console and create a list. Develop a program to print mean, variance andstandard deviation with suitable messages.

4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency ofeach digit with suitable message.

5. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary With distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]

6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip (), len (), list methods sort (), append (), and file methods open (), read lines (), and write ()].

7. Develop a program to backing up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.

8. Write a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0. Develop a suitable program which reads two values from the console and calls a function DivExp.

9. Define a function which takes TWO objects representing complex numbers and returns new complex number with addition of two complex numbers. Define a suitable class ‘Complex’ to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the additionof N complex numbers.

10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use init () method to initialize name, USN and the lists to store marks and total, Use getMarks () method to read marks into the list, and display () method to display thescore card details.]

Suggested Learning Resources:

Text Books

1. **Al Sweigart, "Automate the Boring Stuff with Python", 1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/)**

   (Chapters 1 to 18, except 12) for lambda functions use this link: https://www.learnbyexample.org/python-lambda-function/

2. **Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at http://greenteapress.com/thinkpython2/thinkpython2.pdf**

   (Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

Web links and Video Lectures (e-Resources):

- https://www.learnbyexample.org/python/
- https://www.learnpython.org/
- https://pythontutor.com/visualize.html#mode=edit

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes for list, tuple, string dictionary slicing operations using below link https://github.com/sushantkhara/Data-Structures-And-Algorithms-with-Python/raw/main/Python%203%20_%20400%20exercises%20and%20solutions%20for%20beginn ers.pdf

Course Articulation Matrix (CAM)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
#1	2												2	
#2	3													3
#3		2												
#4			2		2							1		
#5					2				1					

Basics of Java Programming

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – I/II

Course Code:	**P22PLC1053/2053**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Integrated**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P: S)	**2:0:2**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Course objectives

- Learn fundamental features of object oriented language and JAVA
- Set up Java JDK environment to create, debug and run simple Java programs.
- Learn object oriented concepts using programming examples.
- Study the concepts of importing of packages and exception handling mechanism.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Use https://pythontutor.com/visualize.html#mode=edit in order to visualize the Java programs
2. Chalk and talk
3. Online demonstration
4. Hands on problem solving

Module-1 **8 Hours**

An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings

Text book 1: Ch 2, Ch 3

Module-2 **8 Hours**

Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The? Operator, Operator Precedence, Using Parentheses, Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements.

Text book 1: Ch 4, Ch 5

Module-3 **8 Hours**

Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited

Text book 1: Ch 6, Ch 7 (7.1-7.9)

Module-4 **8 Hours**

Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.

Text book 1: Ch 8

Module-5 **8 Hours**

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions.

Text book 1: Ch 9, Ch 10

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1	To explain the features and object oriented concepts in JAVA programming
CO2	To analyze working of bitwise operators in JAVA
CO3	To develop simple programs based on polymorphism and inheritance
CO4	To describe the concepts of importing packages and exception handling mechanism

Programming Assignments

1. Write a JAVA program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a,b, c and use the quadratic formula.
2. Write a JAVA program for multiplication of two arrays.
3. Demonstrate the following operations and sign extension with Java programs (i) << (ii) >> (iii) >>>
4. Write a JAVA program to sort list of elements in ascending and descending order
5. Create a JAVA class called Student with the following details as variables within it.
   USN , NAME, BRANCH, PHONE, PERCENTAGE
   Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentageof these objects with suitable headings.
6. Write a JAVA program demonstrating Method overloading and Constructor overloading.
7. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class bywriting three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA program to read and display at least 3 staff objects of all three categories.
8. Demonstrate dynamic dispatch using abstract class in JAVA.
9. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C. In package P2, create class D inherited from class A in package P1 and class E. Demonstrate working ofaccess modifiers (private, public, protected, default) in all these classes using JAVA.
   Write a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of Array Index Out Of Bound Exception.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Herbert Scheldt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

Web links and Video Lectures (e-Resources):

https://onlinecourses.nptel.ac.in/noc22_cs47/preview

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Conduct on spot problem solving based on JAVA
- Develop simple GUI interfaces for a computer program to interact with users

COs and POs Mapping (Individual teacher has to fill up)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	2											
CO2	2	2			2							
CO3	2	2	2		2							
CO4	3	2	2		2							

Introduction to C++ Programming [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER – I/II**			
Course Code:	**P22PLC1054/2054**	**CIE Marks**	**50**
Course Type (Theory/Practical/Integrated)	**Integrated**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P:S)	**2:0:2:0**	**Exam Hours**	**03**
Total Hours of Pedagogy	**40 hours**	**Credits**	**03**

Module-1	**8 hours**
Limitations of procedure Oriented programming. Object Oriented Programming: Object, Classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism. Functions in C++: Tokens– Keywords, Identifiers and constants. I/O function, simple C++ program, Data Types, Operators in C++, Scope resolution operator. Expressions and their types, Special assignment expressions, control structures. **Textbook 1: Chapter 1 (1.1 to 1.8)** **Textbook 2: Chapter 2 (2.1, 2.2, 2.3) Chapter 3 (3.2 to 3.8,3.13,3.14,3.19,3.20, 3.24)**	
Module-2	**8 hours**
Function in C++ – Call by value, Call by reference, Inline functions, Default arguments, Function Overloading. Classes and Objects: Defining class with data member and member Functions .C++ Program with access specifiers. Static Data Members and Member Functions, Objects as function arguments, Friend Functions. **Textbook 2: Chapter 4(4.3,4.4,4.6,4.7,4.9) Chapter 5(5.3,5.4,5.8,5.11,5.12,5.14,5.15)**	
Module-3	**8 hours**
Constructors and Destructors -Types of Constructors, Destructors Inheritance - Types of Inheritance - Defining Derived classes, Single, Multi-level Multiple, Hierarchical & Hybrid Inheritance. **Textbook 2: Chapter 6 (6.2,6.3,6.4,6.5,6.7,6.11), Chapter 8 (8.1 to8.8)**	
Module-4	**8 hours**
Polymorphism: Operator Overloading(unary operator(++,--),binary operator(+,-)) Exception Handling: Introduction to Exception - Benefits of Exception handling- , Exception handling Mechanism. **Textbook 2:Chapter 7(7.2 to 7.4) Chapter 13(13.2 to 13.5)**	
Module-5	**8 hours**
I/O Streams: C++ Class Hierarchy, File Stream-Text File Handling- Binary File Handling during file Operations. **Textbook 1:, Chapter 12(12.5),Chapter 13 (13.6,13.7)**	

Programming Assignments:

1	Write a C++ program to sort the elements in ascending and descending order.
2	Write a C++ program to find the sum of all the natural numbers from 1 to n.
3	Write a C++ program to swap 2 values by writing a function that uses call by reference technique.
4	Write a C++ program to demonstrate function overloading for the following prototypes. *add(int a, int b)* *add(double a, double b)*
5	Create a class named Shape with a function that prints "This is a shape". Create another class named Polygon inheriting the Shape class with the same function that prints "Polygon is a shape". Create two other classes named Rectangle and Triangle having the same function which prints "Rectangle is a polygon" and "Triangle is a polygon" respectively. Again, make another class named Square having the same function which prints "Square is a rectangle". Now, try calling the function by the object of each of these classes
6	Suppose we have three classes Vehicle, Four Wheeler, and Car. The class Vehicle is the base class, the class Four Wheeler is derived from it and the class Car is derived from the class Four Wheeler. ClassVehicle has a method 'vehicle' that prints 'I am a vehicle', class Four Wheeler has a method 'four Wheeler' that prints 'I have four wheels', and class Car has a method 'car' that prints 'I am a car'.So, as this is a multi-level inheritance; we can have access to all the other classes methods from the object of the class Car. We invoke all the methods from a Car object and print the corresponding outputs of the methods So, if we invoke the methods in this order, car(), four Wheeler(), and vehicle(), then the output will be I am a car I have four wheels I am a vehicle Write a C++ program to demonstrate multilevel inheritance using this.
7	Write a C++ program to create a text file, check file created or not, if created it will write some textinto the file and then read the text from the file.
8	Write a C++ program to write and read time in/from binary file using fstream
9	Write a function which throws a division by zero exception and catch it in catch block. Write a C++program to demonstrate usage of try, catch and throw to handle exception.
10	Write a C++ program function which handles array of bounds exception using C++.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

Textbooks

1. Bhushan Trivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012.
2. Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt. Ltd, Fourth Edition 2010.

Web links and Video Lectures (e-Resources):

1. Basics of C++ - https://www.youtube.com/watch?v=BClS40yzssA
2. Functions of C++ - https://www.youtube.com/watch?v=p8ehAjZWjPw

Tutorial Link:

1. https://www.w3schools.com/cpp/cpp_intro.asp
2. https://www.edx.org/course/introduction-to-c-3

COs and POs Mapping:

CO's	Statement	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	**Apply** the knowledge of object-based programming concepts to solve a given problem.	2	2	2		2								1		
CO2	**Analyze** the given C++ code snippet to identify the bugs and write correct code.	2	2											1		
CO3	**Design** the code to achieve **reusability and extensibility** by means of Inheritance and Polymorphism.	2	2	2		2								1		
CO4	Develop solutions to handle **exceptions and files.**	2	2	2		2								1		

Course Title:	**Communicative English – I**		
Course Code:	**P22ENG106**	**CIE Marks**	**50**
Course Type (Theory/Practical /Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P:S)	**0:2:0:0**	**Exam Hours**	**01 Theory**
Total Hours of Pedagogy	**30 hours**	**Credits**	**01**

Module-1

Introduction to Communication Skills **6 Hours**

Introduction to communication, Meaning and process, Channels of communication, Elements of communication, Barriers to effective communication. Activities - Making introductions, Sharing personal information, Describing feelings and opinions.

Module-2

Listening Skills I **4 Hours**

Hearing vs. Listening, Types of listening, Determinants of good listening, Active listening process, Barriers to listening, Activities - Listening for pronunciation practice, Listening for personal communication, Listening for communication - language functions

Module-3

Speaking Skills I **6 Hours**

Basics of speaking, Elements and Functions of speaking, Structuring your speech, Focusing on fluency, Homographs and Signpost words. Activities – Free Speech and Pick and Speak

Module-4

Reading Skills I **4 Hours**

Developing reading as a habit, Building confidence in reading, improving reading skills, Techniques of reading - skimming and scanning. Activities - understanding students' attitudes towards reading, countering common errors in reading, developing efficiency in reading.

Writing Skills I **4 Hours**

Improving writing skills, Spellings and punctuation, Letter and Paragraph writing. Activity – Writing your personal story

Module-5

Body Language and Presentation Skills **6 Hours**

Elements of body language, Types, Adapting positive body language, Cultural differences in body language. 4 Ps in presentations, Overcoming the fear of public speaking, Effective use of verbal and nonverbal presentation techniques. Activity – Group presentations

Course Outcomes: On completion of this course, students will be able to,

CO 1: Understand the role of communication in personal and professional success

CO 2: Comprehend the types of technical literature to develop the competency of students to apprehend the nature of formal communication requirements.

CO 3: Construct grammatically correct sentences to strengthen essential skills in speaking & writing and to develop critical thinking by emphasizing cohesion and coherence

CO 4: Demonstrate effective individual and teamwork to accomplish communication goals.

Textbooks and Reference Books:

1. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2015.
2. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
3. Developing Communication Skills by Krishna Mohan& Meera Banerjee (Macmillan)
4. The Oxford Guide to Writing and Speaking, John Seely, Oxford.
5. English Language Communication Skills - Lab Manual cum Workbook by Rajesh Kumar Singh, Cengage learning India Pvt Limited – 2018

CO – PO – PSO Matrix

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1												2			
CO2										2					
CO3										2					
CO4									2						
CO									2	2		2			

Integral Calculus, Partial Differential Equations and Numerical methods

[As per Choice Based Credit System (CBCS) & OBE Scheme]

SEMESTER – II

Course Code:	**P22MAEE201**	**CIE Marks:**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks:**	**50**
		Total Marks:	**100**
Teaching Hours/Week (L:T:P):	**2:2:2:0**	**Exam Hours:**	**03**
Total Hours of Pedagogy	**40 hours Theory + 10 to12 Lab slots**	**Credits:**	**04**

Course Learning Objectives:

1	**Familiarize** the fundamentals of Integral calculus and Vector calculus
2	**Analyze** Engineering problems by applying Partial Differential Equations
3	**Develop** the knowledge of solving engineering problems by using numerical Technique.

Unit	Syllabus content	No. of hours	
		Theory	**Tutorial**
I	**Integral Calculus:** Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area and Volume by double integral. Problems. **Beta and Gamma functions**: Definitions, properties, relation between Beta and Gamma functions. Problems. **Self-Study**: Volume by triple integration, Center of gravity	06	02
II	**Vector Calculus:** **Vector Differentiation**: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems. **Vector Integration**: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems. **Self-Study**: Volume integral and Gauss divergence theorem.	06	02
III	**Partial Differential Equations (PDE's)**: Formation of PDE's by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Method of separation of variables. Solution of one-dimensional heat equation and wave equation by the method of separation of variables. **Self-Study**: Derivation of one-dimensional heat equation and wave equation.	06	02

IV	**Numerical methods-1:** **Finite differences**: Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula (All formulae without proof). Problems. **Numerical differentiation:** Numerical differentiation using Newton's	06	02

	forward and backward interpolation formulae,(All formulae without proof)- problems only and Applications to Maxima and Minima **Numerical integration**: Trapezoidal rule, Simpson's $(1/3)^{rd}$ rule, Simpson's $(3/8)^{th}$ rule, and Weddle's rule (All rules without proof)- Illustrative problems **Self-Study**: Sterling's formula, Lagrange's interpolation and Lagrange's inverse Interpolation formula. Boole's rule		
V	**Numerical methods -2:** **Solution of algebraic and transcendental equations**: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. **Numerical Solution of Ordinary Differential Equations (ODE's):** Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector formula (No derivations of formulae). Problems. **Self-Study**: Bisection method. Euler's method Adam-Bashforth method	06	02

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Knowledge to Evaluate double and triple integration and identify the scalar, vector notation of functions of two and three dimensions ,recognize the partial differential equations and Numerical differences.

CO2: Understand to explain Area, Volume by double integration, change to polar coordinates describe divergence and flux in vector field; classify method of solutions of PDE's, Numerical differentiation and integrations.

CO3: Apply the Mathematical properties to evaluate triple integral and improper integral to interpret the irrotational and solenoidal vector field, find the solutions to problem arises in engineering field.

CO4: **Analyze** multiple integrals ,vector differentiations and integration, the Mathematical model by partial differential equations, Numerical solution to algebraic and transcendental, ordinary differential equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

TEACHING - LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana: Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I & II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://ocw.mit.edu/courses/18-303-linear-partial-differential-equations-fall-2006/
4. https://ocw.mit.edu/courses/18-152-introduction-to-partial-differential-equations-fall-2011/
5. http://mcatutorials.com/mca-tutorials-numerical-methods-tutorial.php

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**2**	**2**										
CO2	**2**	**3**										
CO3	**3**	**2**										
CO4	**2**	**3**										
Strength of correlation: Low-1, Medium- 2, High-3												

Course Title:	**Communicative English – II**		
Course Code:	**P22ENG206**	**CIE Marks**	**50**
Course Type (Theory/Practical /Integrated)	**Theory**	**SEE Marks**	**50**
		Total Marks	**100**
Teaching Hours/Week (L:T:P:S)	**0:2:0:0**	**Exam Hours**	**01 Theory**
Total Hours of Pedagogy	**30 hours**	**Credits**	**01**

Module-1	
Listening Skills II	**2 Hours**
Levels of listening, Active listening, Techniques of listening. Activity: Listening for main ideas and Listening for specific information	
Speaking Skills II	**6 Hours**
Language of discussion – Giving opinion, agreeing / disagreeing, asking questions, making suggestions. Sentence stress – content and structure words, Speaking situations, Intonations and Summarizing skills	
Module-2	
Reading Skills II	**2 Hours**
Guessing meaning from the context, Understanding graphical information, Summarizing. Activity: Book Review	
Writing Skills II	**4 Hours**
Linkers and connectives, Sentence and paragraph transformation, Mind mapping techniques, Letter writing, Essay writing	
Module-3	
Email Etiquette	**4 Hours**
Parts of an email, Writing an effective subject line, email language and tone. Activity: Email writing practice - Scenario based emails	
Group Presentations	**2 Hours**
Group presentations by the students	
Module 4	
Goal Setting	**2 Hours**
Defining goals, types of goals, Establishing SMART goals, Steps in setting goals, Goal setting activity	
Individual Presentations	**4 Hours**
Individual presentation by the students	
Module 5	
Teamwork	**4 Hours**
Defining teams, Team vs. Group, Benefits and challenges of working in teams, Stages of team building, Building effective teams, Case studies on teamwork	

Course Outcomes: On completion of this course, students will be able to,

CO 1: Understand the role of communication in personal and professional success

CO 2: Comprehend the types of technical literature to develop the competency of students to apprehend the nature of formal communication requirements.

CO 3: Construct grammatically correct sentences to strengthen essential skills in speaking & writing and to develop critical thinking by emphasizing cohesion and coherence

CO 4: Demonstrate effective individual and teamwork to accomplish communication goals.

Textbooks and Reference Books:

1. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2015.
2. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
3. Developing Communication Skills by Krishna Mohan& Meera Banerjee (Macmillan)
4. The Oxford Guide to Writing and Speaking, John Seely, Oxford.
5. English Language Communication Skills - Lab Manual cum Workbook by Rajesh Kumar Singh, Cengage learning India Pvt Limited – 2018
6. The 7 habits of highly effective people by Stephen R Covey, Simon & Schuster – 2020
7. You Are the Team: 6 Simple Ways Teammates Can Go from Good to Great by Michael G. Rogers

CO – PO – PSO Matrix

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1												2			
CO2										2					
CO3										2					
CO4									2						
CO									2	2		2			