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

(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.

ಪಿ.ಇ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ

ಮಂಡ್ಯ–571 401, ಕರ್ನಾಟಕ

[ವಿ.ಟಿ.ಯು., ಬೆಳಗಾವಿ ಅಡಿಯಲ್ಲಿನ ಸ್ವಾಯತ್ತ ಸಂಸ್ಥೆ]

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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] – Civil Engineering Stream (CES)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MACE101	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22PHCE102	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	**ESC** P22ESCE103	Engineering Mechanics (IC)	CE	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 Foundation for Health									
9	P22RP109	Rapid Prototyping	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

#-P22PHCE102 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.***
- ***Civil and allied branches Students shall opt for any one of the courses from the ESC-I group except, P22ESC1041-Introduction to Civil 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] – Civil Engineering Stream (CES)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MACE201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22CHCE202	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
3	**ESC** P22CED203	Computer – Aided Engineering Drawing	AU / IP /ME	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 Foundation for Health									
9	P22SI209	Social Innovation	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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:	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session
1-hour Lecture (**L**) per week=**1Credit**	04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions
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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.

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#-P22CHCE202 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

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B.E. I – Semester [Chemistry Group] – Civil Engineering Stream (CES)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MACE101	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22CHCE102	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 Foundation for Health									
9	P22RP109	Rapid Prototyping	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

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#-P22CHCE102 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
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P22PLC1053	Basics of JAVA programming	2	0	2
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4	**ESC** P22ESC204X	Engineering Science Course-I	Respective Engg. Dept	3	-	-	-	3	50	50	100
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	OR										
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9	P22SI209	Social Innovation	IIC	1	-	1	-	0	100	-	100
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#-P22PHCE202 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**
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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.***
- ***Civil and allied branches Students shall opt for any one of the courses from the ESC-I group except, P22ESC2041-Introduction to Civil 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] – Computer Science & Engineering Stream (CSE)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MACS101	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22PHCS102	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	**ESC** P22ESCS103	Principles of Programming Using C (IC)	CS / IS / AIML	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 Foundation for Health									
9	P22RP109	Rapid Prototyping	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

#-P22PHCS102 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.***
- ***CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group except, P22ESC1045-Introduction to C Programming***
- ***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] – Computer Science & Engineering Stream (CSE)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MACS201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22CHCS202	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 Foundation for Health									
9	P22SI209	Social Innovation	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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.

#-P22CHCS202 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.***
- ***CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group except, P22ESC2045-Introduction to C Programming***
- ***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 [Chemistry Group] – Computer Science & Engineering Stream (CSE)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MACS101	Calculus, Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22CHCS102	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 Foundation for Health									
9	P22RP109	Rapid Prototyping	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

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#-P22CHCS102 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.***
- ***CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group except, P22ESC1045-Introduction to C Programming***
- ***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] – Computer Science & Engineering Stream (CSE)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MACS201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22PHCS202	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	**ESC** P22ESCS203	Principles of Programming Using C (IC)	CS / IS / AIML	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 Foundation for Health									
9	P22SI209	Social Innovation	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

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#-P22PHCS202 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.***
- ***CSE/ISE and allied branches Students shall opt for any one of the courses from the ESC-I group except, P22ESC2045-Introduction to C Programming***
- ***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 [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, 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									
9	P22RP109	Rapid Prototyping	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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:	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session
1-hour Lecture (**L**) per week=**1Credit**	04-Credits (IC) are to be designed for 40 hours' theory and 12-14 hours of practical sessions
2-hoursTutorial(**T**) per week=**1Credit**	03-Credits courses are to be designed for 40 hours of Teaching-Learning Session
2-hours Practical / Drawing (**P**) per week=**1Credit**	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									
9	P22SI209	Social Innovation	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

#-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, 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									
9	P22RP109	Rapid Prototyping	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

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#-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									
9	P22SI209	Social Innovation	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

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#-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***

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] – Mechanical Engineering Stream

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MAME101	Calculus, Ordinary Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22PHME102	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	**ESC** P22ESME103	Elements of Mechanical Engineering	AU/IP/ME	2	2	0	-	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									
9	P22RP109	Rapid Prototyping	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

#-P22PHME102 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.***
- ***AU/IP/ME Students shall opt for any one of the courses from the ESC-I group except, P22ESC1044-Introduction to Mechanical 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] – Mechanical Engineering Stream (MES)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MAME201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22CHME202	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
3	**ESC** P22CED203	Computer Aided Engineering Drawing	AU / IP / ME	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									
9	P22SI209	Social Innovation	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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

#-P22CHME202 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.***
- ***AU/IP/ME Students shall opt for any one of the courses from the ESC-I group except, P22ESC2044-Introduction to Mechanical 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 [Chemistry Group] – Mechanical Engineering Stream (MES)

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MAME101	Calculus, Ordinary Differential Equations and Linear Algebra	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22CHME102	Applied Chemistry (IC)	CH	2	2	2	-	4	50	50	100
3	**ESC** P22CED103	Computer Aided Engineering Drawing	AU / IP / ME	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									
9	P22RP109	Rapid Prototyping	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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.

#-P22CHME102 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.***
- ***AU/IP/ME Students shall opt for any one of the courses from the ESC-I group except, P22ESC1044-Introduction to Mechanical 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.***
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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] – Mechanical Engineering Stream

Sl. No.	Course & Course Code	Course Title	Teaching Department	Hrs / Week				Credits	Examination Marks		
				L	T	P	SDA		CIE	SEE	Total
1	**ASC** P22MAME201	Integral Calculus, Partial Differential Equations and Numerical methods	MA	2	2	2	-	4	50	50	100
2	**#ASC** P22PHME202	Applied Physics (IC)	PH	2	2	2	-	4	50	50	100
3	**ESC** P22ESME203	Elements of Mechanical Engineering	AU/IP/ME	2	2	0	-	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										
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8	**AEC/SDC** P22IDT208	Innovation and Design Thinking	Any Dept	-	2	-	-	1	50	50	100
	OR										
	AEC/SDC P22SFH208	Scientific Foundations for Health									
9	P22SI209	Social Innovation	IIC	1	-	1	-	0	100	-	100
Total								**20**	**500**	**400**	**900**

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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.

#-P22PHME202 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.***
- ***AU/IP/ME Students shall opt for any one of the courses from the ESC-I group except, P22ESC2044-Introduction to Mechanical 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***

INDEX

Calculus, Differential Equations and Linear Algebra

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

SEMESTER – I

Course Code:	**P22MACE101**	**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 and problems. 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 $\frac{1}{N}\left[\frac{\partial M}{\partial Y}-\frac{\partial N}{\partial x}\right]$ $and\frac{1}{M}\left[\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right]$ 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:

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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.

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	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

Calculus, Differential Equations and Linear Algebra

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

SEMESTER – I

Course Code:	**P22MACS101**	**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
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III	**Ordinary Differential Equations (ODEs) of first order**: Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations Integrating factors on $\frac{1}{N}\left[\frac{\partial M}{\partial Y}-\frac{\partial N}{\partial x}\right] and \frac{1}{M}\left[\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right]$ 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 multivariable's, and match the system of equations in matrix form

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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.

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1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
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Strength of correlation: Low-1, Medium- 2, High-3												

Suggested Learning Resources:

Reference Books

1. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press,3rd Ed., 2016.
2. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – HillBook Co., Network, 6th Ed., 2017.
3. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I andII", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
4. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
5. **James Stewart: "**Calculus" Cengage Publications, 7th Ed., 2019.
6. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
7. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.

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

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CO3	**3**	**2**										
CO4	**2**	**3**										
Strength of correlation: Low-1, Medium- 2, High-3												

Calculus, Ordinary Differential Equations and Linear Algebra

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

SEMESTER – I

Course Code:	**P22MAME101**	**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.
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COURSE OUTCOMES: On completion of the course, student should be able to:

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	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:	**P22PHCE102/202**	**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 Objectives

- To **recall** the concepts of physics related to waves and oscillations, quantum mechanics, elastic properties of materials, fundamentals of LASER and optical fibers used in the applications
- To **understand** the concepts of waves and oscillations and their engineering applications
- To **realize** the concepts of modern physics and quantum mechanics and their applications
- To **study** elastic properties of materials and factors involved for the failure of engineering materials
- To **learn** the fundamentals of LASERs and optical fibers through photonics related to engineering field
- To **study** the concepts and principles of sound and ultrasonics to understand architectural acoustics

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: Oscillations and Shock waves **8 Hours**

Oscillations- Simple Harmonic motion (SHM), differential equation for SHM (derivation), Springs - stiffness factor and its physical significance, series and parallel combination of springs (derivation), Types of spring and their applications. Free, damped and forced oscillations (Qualitative), Types of damping (Graphical Approach). Engineering applications of damped oscillations, resonance and sharpness of resonance.

Shock waves- Mach number and Mach Angle, Mach Regimes, definition and characteristics of Shock waves, Construction and working of Reddy shock tube, Applications of Shock Waves. Numerical problems.

Pre requisites: Basics of Oscillations and waves

Self-learning component: Conservation of energy in SHM

Practical component: Spring Constant and Reddy Shock Tube

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

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

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

Pre requisites: Quantum theory of Radiation

Self-learning component: Blackbody Radiation Spectrum

Practical component: Stefan-Boltzmann law and Planck's Constant
Unit-III: Elastic properties of materials: 8 Hours
Elastic materials (qualitative). Stress-Strain Curve, strain hardening and softening. Elastic Moduli, Poisson's ratio and its limiting values. Relation between q, n, k and σ (derivation), Beams, bending moment of rectangular beam (derivation), I-section girder and their Engineering Applications. Twisting couple per unit twist of a cylinder (derivation), Failures of engineering materials - stress concentration, fatigue and factors affecting fatigue (qualitative). Numerical problems **Pre requisites:** Elasticity, Stress & Strain **Self-learning:** Single Cantilever **Practical component:** Rigidity modulus and Young's modulus
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 carbon dioxide laser. Applications: Lasers as Range finder, Road profiling. 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: Detect damages and faults at remotely accessible places. Numerical problems. **Pre requisite:** Introduction on LASER and Optical fibres **Self-learning component:** Construction and working of Semiconductor LASER **Practical component:** Diffraction Grating and Optical fiber
Unit-V: Architectural Acoustics 8 Hours
Acoustics- Reflection of sound, echo, reverberation and reverberation time, absorption power and absorption coefficient. Types of Acoustics, Requisites for acoustics in auditorium, Sabine's formula (derivation), measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Impact of Noise in Multi-storied buildings Ultrasonics- Introduction, Principle, Measurement of ultrasonic velocity in liquids. Application: Non-destructive method of testing the materials. **Pre requisites:** Basics of Sound **Self-learning:** Eyring's equation **Practical component:** Ultrasonic interferometer

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	Spring Constant – Series and Parallel arrangement	Hands on
2	Spring Constant – Oscillation method	Hands on
3	Verification of Stefan - Boltzmann law	Hands on

4	Verification of Planck's Constant	Hands on
5	Rigidity modulus – Torsional method	Hands on
6	Young's modulus – Uniform bending	Hands on
7	Moment of Inertia – Searl's double bar method	Hands on
8	Wavelength of Laser - Diffraction Grating	Hands on
9	Numerical aperture and angle of acceptance of an optical fiber	Open ended
10	Velocity of Ultrasonic – Ultrasonic interferometer	Open ended
11	Determination of Mach number – Reddy's shock tube	Demonstration
12	PHET interactive simulations	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 oscillations, waves, quantum mechanics, materials properties, photonics and acoustics.
CO2	**Identify** the engineering applications of oscillations and shock waves, quantum mechanics, properties of materials, photonics and acoustics 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 acoustics 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 Learning Resources:

Text Books

1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road,Daryaganj, New Delhi-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.
3. John Wiley & Sons: Engineering Physics - Wiley India Pvt. Ltd, New Delhi.

4. R.K. Gaur, S. L. Gupta ; Engineering Physics – Dhanpat Rai Publications; 2011 Edition

Reference Books

5. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Pub. (P) Ltd.,
6. Building Acoustics: Tor Eric Vigran, Taylor and Francis, 2008 Edition.
7. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd ed.
8. Materials Science for Engineers by James F. Shackelford and Madanapalli K Muralidhara, sixth edition, PearsonEducation Asia Pvt. Ltd., New Delhi.
9. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 ed.

Web links and Video Lectures (e-Resources):

Web links:
Simple Harmonic motion:https://www.youtube.com/watch?v=k2FvSzWeVxQ
Shock waves:https://physics.info/shock/
Shock waves and its applications:https://www.youtube.com/watch?v=tz_3M3v3kxk
Stress- strain curves:https://web.mit.edu/course/3/3.11/www/modules/ss.pdf
Stress curves:https://www.youtube.com/watch?v=f08Y39UiC-o
Oscillations and waves :https://openstax.org › books › college-physics-2e
Uniform Bending: https://youtu.be/AiwnWoeVhrU
Diffraction Grating: https://youtu.be/th9-Ylp0FcU
Spring Constant: https://youtu.be/7Ar04wffp08
Fermi Energy: https://youtu.be/i2bf3_X4h74
Stefan-Boltzmann Constant: https://youtu.be/pBwn1TMkmJ8
Planck's constant: https://youtu.be/nWcejb3S2zY
Torsional Pendulum: https://youtu.be/hteYgW9pT6w

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

Course Code:	**P22PHCS102/202**	**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 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 used in their applications.
- To **study** the dielectric and superconducting properties of materials and their applications.
- To **explore** the rudimental concepts of semiconductors and their advanced applications.
- To **learn** the basics of photonics in LASERs and optical fibers, and their applications.
- To **perceive** the idea of quantum computing and its mathematical requirements in engineering.

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 Super conducting magnets
Practical component: Dielectric Constant and LCR Resonance Circuits

Unit-III: Semiconductor and their applications **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).Variation of conductivity and resistivity with temperature in an intrinsic semiconductor. Applications: Photodiode, LED (construction and working). Hall effect: measurement of hall coefficient, hall voltage and its applications. 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 Fermi Energy

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: Bar code scanner, Laser Printer
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: 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: Quantum Computing **8 Hours**

Wave Function in Ket Notation: Matrix form of wave function, Identity Operator, Determination of I|0> and I|1>, Pauli Matrices and its operations on 0 and 1 states, Mention of Conjugate and Transpose, Unitary Matrix U, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, Orthogonality.
Quantum computers: Difference between classical and quantum computers, Moore's law and its end. Qubits and working principle of their different types, Dirac bracket notations, Bloch sphere, quantum logic gates, single qubit logic gates - Quantum Not Gate, Pauli - Z Gate, Hadamard Gate, Pauli Matrices, Phase Gate (or S Gate), T Gate and multi qubit logic gates - Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of Swap gate, Controlled -Z gate, Toffoli gate.
Pre requisites: Introduction to Quantum Computing and quantum gates.
Self-learning: Operation of logic gates on single and multi – qubits
Practical component:

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	Spring Constant – Series and Parallel arrangements	Hands on
2	Verification of Stefan - Boltzmann law	Hands on
3	Dielectric constant - Charging and discharging of a capacitor	Hands on
4	LCR resonance – Series and parallel circuits	Hands on
5	output and transfer characteristics of a Transistor	Hands on
6	Wavelength of Laser - Diffraction Grating	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	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, properties of materials, semiconductors, photonics and quantum computing
CO2	**Identify** the engineering applications of quantum mechanics, properties of materials, semiconductors, photonics and quantum computing 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 quantum computing with 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 Learning Resources:

Text Books:

10. John Wiley & Sons: Engineering Physics - Wiley India Pvt. Ltd, New Delhi.
11. R.K. Gaur, S. L. Gupta ; Engineering Physics – Dhanpat Rai Publications; 2011 Edition

Reference Books:

1. N.H. Ayachit, P. K. Mittal: Engineering Physics – I. K. International Publishing House Pvt. Ltd. New Delhi
2. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
3. 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.
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7. 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 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.

7. Chalk and Talk	10. Interactive simulations and animations
8. Flipped Class	11. Online learning videos on theory topics
9. Blended mode of learning	12. 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
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CO5	3			2	1				1			1

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

Suggested Learning Resources:

Books

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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
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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 Physics

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

SEMESTER – I/II

Course Code:	**P22PHME102/202**	**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 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 **understand** the concepts of waves and oscillations and their engineering applications
- To **realize** the concepts of modern physics and quantum mechanics in engineering applications
- To **study** elastic properties of materials and factors involved for the failure of engineering materials
- To **learn** the fundamentals of LASERs and optical fibers through photonics related to engineering field
- To **study** the electrical and thermal conductivity of materials by the principles of applied physics

Pedagogy:

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

7. Chalk and Talk	10. Interactive simulations and animations
8. Flipped Class	11. Online learning videos on theory topics
9. Blended mode of learning	12. Hands-on and open ended experiments

Unit-I: Oscillations and Shock waves **8 hours**

Oscillations - Simple Harmonic motion (SHM), differential equation for SHM (derivation), Springs - Stiffness Factor and its Physical Significance, series and parallel combination of springs (derivation), Types of spring and their applications. Free, damped and forced oscillations (qualitative), Types of damping (Graphical Approach). Engineering applications: damped oscillations, resonance and sharpness of resonance.

Shock waves - Mach number and Mach Angle, Mach Regimes, definition and characteristics of Shock waves, Construction and working of Reddy shock tube, Applications of Shock Waves, Numerical problems.

Pre requisites: Basics of Oscillations and Waves

Self-learning component: Conservation of energy in SHM

Practical component: Spring Constant and Reddy shock tube

Unit-II: 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-III: Elastic properties of materials:	**8 hours**
Elastic materials (qualitative). Stress-Strain Curve, Strain hardening and softening. Elastic Moduli, Poisson's ratio and its limiting values. Relation between q, n, k and σ (derivation), Beams, bending moment of rectangular beam (derivation), I-section girders and their Engineering Applications. Twisting couple per unit twist of a cylinder (derivation), Failures of engineering materials - ductile fracture, brittle fracture, stress concentration (qualitative). Numerical problems **Pre requisites:** Elasticity, Stress & Strain **Self-learning:** Single Cantilever **Practical component:** Rigidity modulus and Young's modulus	
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 carbon dioxide laser. Applications: Lasers drilling, cutting, welding. 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: Industries and mechanical inspections. Numerical problems. **Pre requisite:** Introduction on LASER and Optical fibers **Self-learning component:** Construction and working of Semiconductor LASER **Practical component:** Diffraction Grating and Optical fiber	
Unit-V: Electrical and Thermal conductivity of materials	**8 hours**
Electrical conductivity - Failures of classical free electron theory (Qualitative), Quantum free electron theory - Assumptions, density of states (derivation), Fermi level, Fermi-energy, Fermi factor, variation of Fermi factor with energy and temperature. Expression for electrical conductivity (no derivation), merits of quantum free electron theory. Thermal conductivity - Thermal conductivity of good conductor by Searle's method, thermal conductivity of bad conductor by Lee and Charlton method, Wideman-Franz law. **Pre requisites:** Introduction on classical free electron theory **Self-learning component:** Free electron density in a metal **Practical component:** Fermi energy of a metal and Lee & Charlton method	

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	Spring Constant – Series and Parallel arrangements	Hands on
2	Verification of Stefan - Boltzmann law	Hands on
3	Verification of Planck's Constant	Hands on
4	Rigidity modulus – Torsional method	Hands on
5	Young's modulus – Uniform bending	Hands on
6	Wavelength of Laser - Diffraction Grating	Hands on
7	Thermal Conductivity - Lee and Charlton method	Hands on
8	Determination of Fermi energy of copper	Hands on
9	Velocity of Ultrasonic – Ultrasonic interferometer	Open ended

10	Young's modulus – Single Cantilever	Open ended
11	Determination of Mach number - Reddy's shock tube	Demonstration
12	PHET Simulation (Spring constant by oscillation method)	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 oscillations, waves, quantum mechanics, materials properties, photonics, electrical and thermal conductivity of materials.
CO2	**Identify** the engineering applications of oscillations, waves, quantum mechanics, dielectric and superconducting properties of materials, photonics , electrical and thermal conductivity of the materials with basic knowledge of physics
CO3	**Formulate** the needed mathematical expressions to answer advanced engineering problems using theoretical knowledge of applied physics.
CO4	**Solve** the numerical problems related to engineering field in quantum mechanics, materials properties, photonics and acoustics 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 Learning Resources:

Text Books

14. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
15. 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.
16. John Wiley & Sons: Engineering Physics - Wiley India Pvt. Ltd, New Delhi.
17. R.K. Gaur, S. L. Gupta ; Engineering Physics – Dhanpat Rai Publications; 2011 Edition

Reference Books:

18. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi
19. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltd.,
20. Building Acoustics : Tor Eric Vigran, Taylor and Francis, 2008 Edition.
21. Photometry Radiometry and Measurements of Optical Losses, Micheal Bukshtab, Springer, 2nd edition.
22. Materials Science for Engineers by James F. Shackelford and M K Muralidhara, 6th ed, Pearson Ed. Pvt. Ltd
23. Lasers and Non Linear Optics, B B Loud, New Age Internationals, 2011 edition

Web links and Video Lectures (e-Resources):
Web links: Simple Harmonic motion:https://www.youtube.com/watch?v=k2FvSzWeVxQ Stress- strain curves:https://web.mit.edu/course/3/3.11/www/modules/ss.pdf Stress curves:https://www.youtube.com/watch?v=f08Y39UiC-o Oscillations and waves :https://openstax.org › books › college-physics-2e Uniform Bending: https://youtu.be/AiwnWoeVhrU Diffraction Grating: https://youtu.be/th9-Ylp0FcU Spring Constant: https://youtu.be/7Ar04wffp08 Fermi Energy: https://youtu.be/i2bf3_X4h74 Stefan-Boltzmann Constant: https://youtu.be/pBwn1TMkmJ8 Planck's constant: https://youtu.be/nWcejb3S2zY Torsional Pendulum: https://youtu.be/hteYgW9pT6w
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:	**P22CHCE102/202**	**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 by industry 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: Energy Sources and High energy fuels **8 hours**

Fuels: Introduction, calorific value, determination of calorific value of solid fuel using bomb calorimeter, and numerical problems.

Green fuels: Introduction, power alcohol, synthesis and applications of biodiesel.

Energy devices: Introduction, construction, working, and applications of Photovoltaic cells.

Batteries: Introduction, Characteristics, Construction & applications of Li-ion battery, Ni-MH battery, Ag_2O- Zn battery and methanol-oxygen fuel cell.

High energy fuels: Production (water electrolysis), advantages and storage of hydrogen.

Self-learning: Plastic recycling to fuels and its monomers or other useful products

Module-2: Macromolecules for engineering applications **8 hours**

Polymers: Introduction, methods of polymerization, molecular weight, number average, weight average, numerical problems, synthesis, properties and industrial applications of Chlorinated polyvinylchloride (CPVC) and polystyrene.

Fibers: Introduction, synthesis, properties and industrial applications of Kevlar and Polyester.

Plastics & Adhesive: Introduction, synthesis, properties and industrial applications of polyurethane and Epoxy resin.

Cement: Introduction, types, properties, testing and industrial applications of cement

Lubricants: Introduction, classification, properties and application of lubricants.

Self-learning:

Biodegradable polymer: Introduction, synthesis, properties and application of Poly-lactic acid.

Module-3: Corrosion science and Metal finishing **8 hours**

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal, differential aeration (waterline and pitting), stress corrosion (caustic embrittlement). **Corrosioncontrol**: Metal coating-galvanization, surface conversion coating-anodization and cathodic protection-sacrificial anode and impressive current methods. Corrosion testing by weight loss method. Corrosion penetration rate (CPR)-numerical problems.

Metal finishing: Introduction, technological importance, differences, Electroplating: Introduction, Electroplating of Nickel (hard and decorative). Electro-less plating: Introduction, electro-less plating of copper on PCB.

Self-learning: Factors affecting the rate of corrosion, Factors influencing the nature of quality electro deposit (Current density, concentration of metal ion, pH, and temperature)**.**

Module-4: Phase rule and Analytical techniques **8 hours**

Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: one component- water system, Two component-Pb-Ag systems, Desilverisation of lead by pattinson's process.

Analytical techniques: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetric); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pHof beverages.

Self-learning: Determination of viscosity of bio-fuel and its correlation with temperature.

Module-5: Engineering Materials and applications **8 hours**

Alloys: Introduction, classification, compositions, properties and applications of Stainless Steel, Solders, Brass and Alnico.

Ceramics: Introduction, classification based on chemical composition, properties and applications of ceramics (perovskites or $CaTiO_3$).

Nano-Chemistry: Introduction, size dependent properties of nano-material (surface area, electrical, optical and thermal), synthesis of nano-particles by sol-gel, and co-precipitation method.

Nano-materials: Introduction, properties and engineering applications of carbon nano-tubes and graphene.

Self-learning: Abrasives: Introduction, classification, properties and application of silicon carbide (carborandum).

PRACTICAL MODULE

A – Demonstration (any two) offline/virtual:

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

A2. Synthesis of iron oxide nano-particles

A3. Determination of COD of industrial waste water

A4. Determination of Copper in brass alloy.

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 percentage of iron in stainless steel
D2. Synthesis of biodiesel from vegetable oil.
D3. Determination of total hardness of water.
D4. Analysis of constituents present in Portland cement.

Applied Chemistry [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER – I**			
Course Code:	**P22CHCS102/202**	**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 engineering applications.
- 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 solve societal 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 by industry 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: **Electronic materials and display systems** **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.

Display systems: Composition, Characteristics, working and applications of Liquid Crystal Displays (LCD's), Organic light emitting diodes (OLED's), Quantum Light emitting diodes (QLED's), Light emitting electrochemical cells.

Electro-plating and Electro-less plating–Introduction, technological importance, Differences. Principles and applications of electro-plating of nickel and Electro-less plating of copper on PCB.

Self -Learning Topics:

Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminum (Al), and Brominated flame retardants in computers

MODULE 2: Sensors and Energy Systems	**8hours**
Sensors: Introduction, working principle and applications of Conductometric sensors, Electrochemicalsensors, Thermometric sensors, and Optical sensors. Sensors for the measurement of DO. Electrochemical sensors for the pharmaceuticals, surfactants, hydrocarbons, electrochemical gas sensors for SOx, NOx, Disposable sensors in the detection of bimolecular and pesticides. **Energy Systems**: Introduction and characteristics of batteries. Construction, working and applications of Lithium ion, Ni- MH and Ag_2O-Zn batteries. **Self -Learning Topics**: Type of electrochemical sensors. Gas sensor- O_2 sensor, biosensor- Glucose sensors.	
MODULE 3: Corrosion and electrodes system	**8hours**
Corrosion: Introduction, electrochemical theory of corrosion, types-differential metal, differential aeration, caustic embritlement, Corrosion control-galvanization, tinning, anodization and sacrificial anode and impressive current method. Corrosion penetration rate (CPR) - introduction and numerical problems. **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 cells – Definition, construction and Numerical problems. **Analytical techniques**: Introduction, principle and instrumentation: Conductometry – estimation of weak acid. Potentiometry – estimation of iron, Colorimeter-Copper ***Self-Study Components:*** IR and UV- visible spectroscopy.	
MODULE 4: Polymers and Green fuels	**8hours**
Polymers: Introduction, Molecular weight - Number average, weight average and numerical problems, Synthesis and applications of Epoxy resins, Kevlar. Conducting polymers – synthesis and conducting mechanism of poly-acetylene and commercial applications. Preparation, properties, and commercial applications of graphene oxide. **Green fuels:** Introduction, construction and working of solar photovoltaic cell, advantages, and disadvantages. Generation of energy (green hydrogen) from water electrolysis, advantages, and storage of hydrogen. ***Self -Learning Topics:*** Types of fuel cells-H_2–O_2 fuel cell and methanol - oxygen fuel cell	
MODULE 5: E-Waste Management	**8hours**
E-Wastes: Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. E - Waste. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste, recycling and recovery, different approaches of recycling (separation, Thermal treatments, hydrometallurgical extraction, pyro-metallurgical methods, direct recycling). Extraction of gold from E-waste. Role of stake holders in environmental management of e-waste (producers,consumers, recyclers, and statutory bodies). ***Self -Learning Topics:*** Impact of heavy metals on environment and human health.	

PRACTICAL
MODULE

A – Demonstration (any two) offline/virtual:

A1. Synthesis of Iron-oxide Nano-particles
A2. Electrolysis of water
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. Construction of photovoltaic cell.
D2. Design an experiment to Identify the presence of proteins in given sample
D3. Determination of total hardness of water.
D4. Analysis of constituents present in Portland cement.

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 by industry 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 .

Applied Chemistry [As per Choice Based Credit System (CBCS) & OBE Scheme] **SEMESTER – I/II**			
Course Code:	**P22CHME102/202**	**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 engineering applications.
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- 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: Energy Sources, Conversion and storage **8 hours**

Fuels: Introduction, calorific value, determination of calorific value of solid fuel using bomb calorimeter and numerical problems.

Green fuels: Introduction, power alcohol, synthesis and applications of biodiesel.

Energy devices: Introduction, construction, working, and applications of Photovoltaic cells.

Batteries: Introduction, Characteristics, Construction & applications of Li-ion battery, Ni-MH battery, Ag_2O-Zn battery and methanol-oxygen fuel cell.

High energy fuels: Production (water electrolysis), advantages and storage of hydrogen.

Self-learning: Plastic recycling to fuels and its monomers or other useful products.

Module-2: Corrosion science and Engineering **8 hours**

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal, differential aeration (waterline and pitting), stress corrosion (caustic embritlement). Corrosioncontrol: Metal coating-galvanization, tinning, surface conversion coating-anodization and cathodic protection-sacrificial anode and impressive current methods. Corrosion testing by weight loss method. Corrosion penetration rate (CPR)-numerical problems.

Metal finishing: Introduction, technological importance, differences, Electroplating: Introduction, Electroplating of Nickel. Electro-less plating: Introduction, electro-less plating of copper on PCB.

Self-learning: Factors affecting the rate of corrosion, Factors influencing the nature of quality electro deposit (Current density, concentration of metal ion, pH, and temperature)**.**

Module-3: Macromolecules for engineering applications	**8 hours**
Polymers: Introduction, methods of polymerization, molecular weight, number average, weightaverage, numerical problems, synthesis, properties and industrial applications of Chlorinated polyvinylchloride (CPVC), polystyrene and Butyl rubber. Glass transition temperature: factors affecting on T_g and its significances. **Biodegradable polymer**: Introduction, synthesis, properties and application of PLA. **Fibers:** Introduction, synthesis, properties and industrial applications of Kevlar and Polyester. **Plastics and Adhesive:** Introduction, synthesis, properties and industrial applications of polyurethane and Epoxy resin. **Lubricants**: Introduction, classification, properties and applications of lubricants. **Self-learning: Composites:** Introduction, properties and industrial applications of carbon based reinforcedmaterials and metal matrix polymer composites.	
Module-4: Phase rule and Analytical techniques	**8 hours**
Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: one component- water system, Two component-Pb-Ag systems, Desilverisation of lead by pattinson's process. **Analytical techniques**: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetric); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pHof beverages. **Self-learning:** Determination of viscosity of bio-fuel and its correlation with temperature.	
Module-5: Materials for mechanical applications	**8 hours**
Alloys: Introduction, classification, composition, properties and application of Stainless Steel, Solders, Brass and Alnico. **Ceramics**: Introduction, classification based on chemical composition, properties and applications of ceramics (perovskites or $CaTiO_3$). **Nano-Chemistry:** Introduction, size dependent properties of nano-material (surface area, electrical, optical and thermal), synthesis of nano-particles by sol-gel, and co-precipitation method. **Nano-materials:** Introduction, properties and engineering applications of carbon nano-tubes and graphene. **Self-learning: Abrasives**: Introduction, classification, properties and application of silicon carbide (carborandum).	

PRACTICAL MODULE

A – Demonstration (any two) offline/virtual:

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

A2. Synthesis of iron oxide nano-particles

A3. Determination of COD of industrial waste water

A4. Determination of copper in brass alloy.

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 photometry

D – Open Ended Experiments (any two):

D1. Estimation of percentage of iron in steel

D2. Synthesis of biodiesel

D3. Determination of total hardness of water.

D4. Analysis of constituents present in Portland cement.

Engineering Mechanics

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

SEMESTER – I/II

Course Code:	**P22ESCE103/203**	**CIE Marks:**	**50**
Course Type (Theory/Practical/Integrated)	**Theory**	**SEE Marks:**	**50**
		Total Marks:	**100**
Teaching Hours/Week (L:T:P):	**2:2:0:0**	**Exam Hours:**	**03**
Total Number of Pedagogy:	**25 hrs Lecture+25 hrs Tutorial = 50 hrs**	**Credits:**	**03**

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

1. To develop students' ability to analyze the problems involving forces, moments with their applications.
2. To analyse the member forces in trusses
3. To make students to learn the effect of friction on different planes
4. To develop the student's ability to find out the centre of gravity and moment of inertia and their applications.
5. To make the students learn about kinematics and kinetics and their applications.

Teaching-Learning Process:

These are sample Strategies; which teachers can use to accelerate the attainment of the variouscourse 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. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) 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 thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple 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 helpsimprove the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.

UNIT – I	**10 Hours**

Resultant of coplanar force system: Basic dimensions and units, Idealizations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force System, Resultant of coplanar non-concurrent force system, Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, Numerical examples.

UNIT – II	**10 Hours**
SUPPORT REACTION: types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of staticallydeterminate beams subjected to various types of loads, Numerical examples. **Friction:** Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane,equilibrium of blocks on inclined plane, ladder friction, wedge friction Numerical examples.	
UNIT – III	**10 Hours**
Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.	
UNIT – IV	**10 Hours**
Centroid of Plane areas: Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples. **Moment of inertia of plane areas:** Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, Moment of inertia of composite areas and simple built up sections, Numerical examples.	
UNIT – V	**10 Hours**
DYNAMICS: Introduction to dynamics, Classification, linear and curvilinear motion- projectiles, Centripetal and centrifugal forces, banking/super elevation. Introduction to work, power and energy, impulse – numerical problems.	

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 knowledge of basic science and mathematics to classify the force systems, Compute its resultant and Analyze the trusses.	Applying	L3
CO2	**Analyze** the system of forces in equilibrium with or without frictional forces.	Analyzing	L4
CO3	**Identify** the centroid and composite moment of inertia of irregular and built up sections.	Applying	L3
CO4	**Analyze** the problems with respect to linear motion, curvilinear motion and energy.	Analyzing	L4

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&i ndex=2
3) https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5
4) https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18
5) https://www.youtube.com/watch?v=3YBXteL-qY4
6) https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10
7) https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7
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
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
01	**Apply** the knowledge of basic science and mathematics to classify the force systems, Compute its resultant and Analyze the trusses.	2	2											2	1	
02	**Analyze** the system of forces in equilibrium with or without frictional forces.	2	2											2	1	
03	**Identify** the centroid and composite moment of inertia of irregular and built up sections.	2	2											2		
04	**Analyze** the problems with respect to linear motion, curvilinear motion and energy.	2	2											2	1	

Principles of Programming using C

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

SEMESTER – I

Course Code:	**P22ESCS103/203**	**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**	**3+2**
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-worldproblems

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 structured programmingconstructs 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, whichpromotes 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 than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem and encourage the studentsto 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'spossible, it helps to improve the students' understanding.

Use https://pythontutor.com/visualize.html#mode=edit in order to visualize theoperations of C Programs

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

Introduction to C: Introduction to computers, input and output devices, designing efficientprograms. 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-LearningProcess	Chalk and talk method/Power Point Presentation/ Web Content:https://tinyurl.com/4xmrexre

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-LearningProcess	Chalk and talk method/ Power Point Presentation
Module-3	**(8 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, two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays, applications of arrays. **Textbook: Chapter** 11.1-11.10**,** 12.1-12.10,12.12	
Teaching-Learning Process	Chalk and talk method/ Power Point Presentation
Module-4	**(6 Hours of Pedagogy)**
Strings and Pointers: Introduction, string taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings. Pointers: Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers **Textbook: Chapter 13.1-13.6, 14-14.7**	
Teaching-Learning Process	Chalk and talk method/ Power Point Presentation
Module-5	**(6 Hours of Pedagogy)**
Structure, Union, and Enumerated Data Type: Introduction, structures and functions, Unions, unionsinside structures, Enumerated data type. **Files:** Introduction to files, using files in C, reading and writing data files. , Detecting end of file **Textbook: Chapter 15.1 – 15.10, 16.1-16.5**	
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 recognize the hardware parts.
CO2	Apply programming constructs of C language to solve the real world problem
CO3	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 in implementing solutions
CO5	Design and Develop Solutions to problems using modular programming constructs

Programming Assignments

1. Simulation of a Simple Calculator.
2. Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
3. An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit:for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs.100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amountis charged. Write a program to read the name of the user, number of units consumed and print out the charges.
4. Write a C Program to display the following by reading the number of rows as input,

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

---

n^{th} row

5. Implement Binary Search on Integers.
6. Implement Matrix multiplication and validate the rules of multiplication.
7. Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function.Print both the results with appropriate inferences.
8. Sort the given set of N numbers using Bubble sort.
9. Write functions to implement string operations such as compare, concatenate, and find string length. Use theparameter passing techniques.
10. Implement structures to read, write and compute average- marks of the students, list the students scoring aboveand below the average marks for a class of N students.
11. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored inan array of N real numbers.
12. 12. Write a C program to copy a text file to another, read both the input file name and target file name.

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.
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.
   https://tinyurl.com/4xmrexre

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

- Quizzes
- Assignments
- Seminars

COs and POs Mapping :

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

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 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, 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	PS O1	PS O2
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 solve them.
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 outcome (Course Skill Set)

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

CO1: Apply the basic knowledge of physics and mathematics to understand the principles of Semiconductor devices, Transducers, Boolean algebra, digital gates and basic communication systems.

CO2: Analyze the working of transistor circuits, Digital circuits and Transducers.

CO3: Analyze the applications of diodes, Transistors and gates.

CO4: Design the circuits using Op-amp and gates.

A. CO v/s PO Mapping Table

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

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

Elements of Mechanical Engineering

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

SEMESTER – I/II

Course Code:	**P22ESME103/203**	**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 learning Objectives: The objectives of this course are,

- To provide essential basic knowledge of mechanical engineering science in technology.
- To understand the technical and operational features of components and systems used in engineering practices.
- To acquire the knowledge of sources of energy and energy conversion systems.
- To acquire the knowledge of conventional and non-conventional methods of manufacturing processes.
- To understand the modern manufacturing technologies in mechanical engineering science.

Course Content

UNIT-I

Introduction: Role of mechanical engineering science in technology, definitions with examples: Prime movers, Mechanisms, Machines and Machine Tools.

Source of Energy: Conventional (Fossil fuels, hydel energy) and Non-Conventional (Solar flat plate collector, Wind, Tidal, Geothermal, Bio-gas and Nuclear).

Properties of steam: Formation of steam with constant pressure, type and properties of steam-specific volume, internal energy and dryness fraction (numerical problems).

8 Hrs

UNIT-II

Energy Conversion Systems: Steam turbine: Introduction, classification, working principle of impulse and reaction turbines. **Gas turbine:** Introduction, classification, working principle of open and closed type. **Hydraulic turbine**: Introduction, classification, working principle of impulse (Pelton Wheel) and reaction (Francis) turbines.

IC Engines: Classification, parts and its nomenclature, Four-stroke petrol and diesel engines (P-V diagram of Otto and Diesel cycles), diesel engine vs petrol engine, simple numericals on engine performance parameters- indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency and specific fuel consumption. Automobiles-Transmission systems, suspension system, E-Vehicles, Hybrid vehicles.

8 Hrs

UNIT-III

Refrigeration and Air Conditioning: Introduction, types of refrigerants and their properties, working principle of vapour compression refrigeration system, window and split air conditioners, simple numericals on COP of refrigerator.

Power Transmission: Belt Drives: Flat belt drives-open and cross (No derivation), slip and creep, velocity ratio, and idler pulley (No numerical). Gear drives: Classification of gears, velocity ratio for simple and compound gear trains (No derivation and numerical).

8 Hrs

UNIT-IV

Manufacturing Processes and Machine Tools:

Castings processes: Patterns and moulding, hot working and cold working. **Metal forming processes**: Extrusion, drawing, rolling, forging, forging operations. **Metal Joining Processes:** Soldering, Brazing**,** Arc Welding and Gas Welding.

Machine Tools: Lathe: working principle, lathe specifications, operations - turning, facing, knurling, thread cutting, taper turning by swiveling of compound rest. Drilling machine tool: working principle, operations- drilling, reaming, boring, counter boring, counter sinking and tapping.

8 Hrs

UNIT-V

Modern Manufacturing Technologies:

Non-conventional manufacturing: Working principle and applications of EDM, ECM and WJM. **Additive manufacturing:** Definition, classification, advantages and dis-advantages and Basics of 3-D printing technology.

Robotics: Introduction, joints and links, end effectors, common robot configurations; cartesian, cylindrical, polar and spherical coordinates. Sensors in robotics and applications of robots.

Automation: Introduction, types of Automation, Computer Numerical Control (CNC) machines: Basic elements of CNC, advantages and disadvantages.

8 Hrs

Text Books

1. K R Gopala Krishna, **"Elements of Mechanical Engineering",** 30th Edition, Subhas Publications, 2015, ISBN:13-1234567153375.
2. Mikell P.Groover, **"Principles of modern manufacturing",** SI Version, Wiley India, 2018, ISBN:108126573058.

Reference Books

1. S Trymbaka Murthy, **"A text book of Elements of Mechanical Engineering"**, IK International Publishing House Pvt. Ltd, 2008, ISBN-3980578571.
2. P.K.Nag, **"Basic and applied Thermodynamics",** 2nd Edition, McGraw Hill Education, 2017, ISBN:100070151318.
3. K.P. Roy, S K Hajra Choudhury, A K Hajra Choudhury, **"Elements of Mechanical Engineering",** Media Promoters, 2012.
4. R.K. Rajput, **"Elements of Mechanical Engineering",** Firewall Media, 2005.

Web Resources

1. https://www.youtube.com/watch?v=Zgp86PVXXuQ(Energyresources)
2. https://nptel.ac.in/courses/112/103/112103249/(HydraulicMachines)
3. https://www.youtube.com/watch?v=c52hmb-IPJw(TypesofBoilers)
4. https://nptel.ac.in/courses/112/103/112103262/(I CEngine)
5. https://nptel.ac.in/courses/112/105/112105128/(Refrigeration)
6. https://nptel.ac.in/courses/116/102/116102012/(NotesonDrives)
7. https://nptel.ac.in/courses/112/107/112107213/(ManufacturingandJoining)
8. https://nptel.ac.in/courses/112/105/112105233/(MetalformingProcesses)
9. https://nptel.ac.in/courses/112/105/112105211/(CNC)
10. https://nptel.ac.in/courses/112/105/112105249/(Robotics)

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

1. **Apply** the fundamentals of mechanical engineering to understand the technical and operational features of components and systems used in engineering practices.
2. **Identify** the different sources of energy to **analyse** the energy conversion and transmission systems through the application of engineering principles.

3. **Apply** the knowledge of machinery, tools, and other equipment used in conventional and non-conventional methods of manufacturing process.
4. **Apply** the knowledge of various automation encountered in manufacturing process and engineering practices.

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 to understand the technical and operational features of components and systems used in engineering practices.	3												1	
CO2	**Identify** the different sources of energy to **analyse** the energy conversion and transmission systems through the application of engineering principles.	3	2											1	
CO3	**Apply** the knowledge of machinery, tools, and other equipment used in conventional and non-conventional methods of manufacturing process	3													
CO4	**Apply** the knowledge of various automation encountered in manufacturing process and engineering practices.	3													

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	9		38	38%
CO2	9	2+9	2+9			31	31%
CO3				2+9	9	20	20%
CO4					2+9	11	11%
	20	20	20	20	20	100	100%
Application =80% Analysis = 20%							

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)	**3:0:0:0**	**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 induction motors.
- 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 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. 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:

CO1: Apply the basic knowledge of physics and mathematics to understand the principles of Semiconductor devices, Boolean algebra, digital gates, Basic communication systems and embedded systems.

CO2: Analyze the working of transistor circuits, Digital circuits.

CO3: Analyze the applications of diodes, Transistors, gates and embedded systems.

CO4: Design the circuits using Op-amp and gates.

A. CO v/s PO Mapping Table

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2		2												
CO3		2												
CO4			1											

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
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

11. https://nptel.ac.in/courses/116/102/116102012/
12. https://www.youtube.com/watch?v=Zgp86PVXXuQ
13. https://nptel.ac.in/courses/112/105/112105211/
14. https://nptel.ac.in/courses/112/105/112105249/
15. 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 their characteristics.
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 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 than simply recall it.
6. Introduce Topics in manifold representations.
7. Show the different ways to solve the same problem with different circuits/logic 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 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 of Technologies, 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. CRC Press.
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

3. A. V. Srinivasan, **"Smart Structures: Analysis and Design"**, Cambridge University Press, Cambridge, New York, 2001, ISBN: 978-0521659772.
4. P. Gauenzi, **"Smart Structures"**, Wiley, Oct 2009, ISBN: 978-0-470-68243-2.
5. 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

16. https://nptel.ac.in/courses/112104173/
17. https://nptel.ac.in/courses/112104173/
18. https://nptel.ac.in/courses/112104251/
19. 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,

5. **Apply** the fundamental characteristics of metals, polymers, ceramics and shape memory alloys in different engineering applications.
6. **Apply** the knowledge of fluid characteristics in analysing the behavior of electro-rheological and magneto-rheological fluids.
7. **Identify** the different sensors and actuators used in engineering applications.
8. **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 outcome (Course Skill Set)

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

CO1	Explain the cybercrime terminologies
CO2	Describe Cyber offenses and Botnets
CO3	Illustrate Tools and Methods used on Cybercrime
CO4	Explain Phishing and Identity Theft
CO5	Justify the need of computer forensics

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

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												
CO2												
CO3												
CO4												
CO5												

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:

$$x = 1/3(y_1^2 + z_1^2$$

   (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

Department	**Sem1**	*SubjectA*
		SubjectB
		SubjectC
	Sem2	*SubjectE*
		SubjectF
		SubjectG
	Sem3	*SubjectH*
		SubjectI
		SubjectJ

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 outcome (Course Skill Set)

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

CO1	Demonstrate proficiency in handling loops and creation of functions.
CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3	Develop programs for string processing and file organization
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.

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

COs and POs Mapping :

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

Rapid Prototyping

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

SEMESTER - I

Course Code:	**P22RP109**	**Credits:**	**00**
Teaching Hours/Week (L:T:P):	**1:0:1**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**24**	**SEE Marks:**	**-**

Course objectives:

1) To turn ideas into working prototypes showcasing their technical proficiency.
2) Students will learn how to design and prototype their ideas.
3) Through a series of lectures and exercises students will learn and practice different prototyping techniques.

Unit - 1 Introduction to Prototyping 6 Hrs

Introducing to innovation and Design Thinking, User Interface and User Experience using paper prototyping and Figma

Unit - 2 CAD modelling and Hand tools 6 Hrs

2D CAD Modeling using onshape and 3D CAD Modeling, Introduction to Laser Cutting, 3D printing and Hand tools

Unit - 3 Prototyping using Electronic Tools 6 Hrs

Introduction to basic electronics components, Arduino programming, sensors and their applications

Unit - 4 BOT CODING, building and Testing 6 Hrs

Designing of bots for specific applications, building and testing the performance of Bots

Students will be challenged to build bots for a specific application of choice and will be given access to competitions in state and national levels to exhibit their applications and prototypes

Integral Calculus, Partial Differential Equations andNumerical methods

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

SEMESTER – II

Course Code:	**P22MACE201**	**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, Vector calculus, Numerical Techniques
2	**Analyze** Engineering problems by applying Partial Differential Equations Methods
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 forward and backward interpolation formulae,(All formulae without proof)-problems only and Applications to Maxima and Minima	06	02

	Numerical integration: Trapezoidal rule, Simpson's $(\frac{1}{3})^{rd}$ rule, Simpson's $(\frac{3}{8})^{th}$ 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												

Integral Calculus, Partial Differential Equations andNumerical methods

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

SEMESTER – II

Course Code:	**P22MACS201**	**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 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 $(\frac{1}{3})^{rd}$ rule, Simpson's $(\frac{3}{8})^{th}$ 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

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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												

Suggested Learning Resources:

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

Reference Books

1. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press,3rd Ed., 2016.
2. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – HillBook Co., Newyork, 6th Ed., 2017.
3. **Gupta C.B, Sing S. R., and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", McGraw Hill Education(India) Pvt. Ltd 2015.
4. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
5. **James Stewart: "**Calculus" Cengage Publications, 7th Ed., 2019.
6. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
7. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6thEd., 2017.

Integral Calculus, Partial Differential Equations andNumerical 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 $(\frac{1}{3})^{rd}$ rule, Simpson's $(\frac{3}{8})^{th}$ 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.

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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												

Integral Calculus, Partial Differential Equations andNumerical methods

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

SEMESTER – II

Course Code:	**P22MAME201**	**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 forward and backward interpolation formulae,(All formulae without proof)-	06	02

	problems only and Applications to Maxima and Minima **Numerical integration**: Trapezoidal rule, Simpson's $(\frac{1}{3})^{rd}$ rule, Simpson's $(\frac{3}{8})^{th}$ 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

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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.

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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:

6. Communication Skills by Sanjay Kumar and Pushpa Lata, Oxford University Press - 2015.
7. Everyday Dialogues in English by Robert J. Dixson, Prentice-Hall of India Ltd., 2006.
8. Developing Communication Skills by Krishna Mohan& Meera Banerjee (Macmillan)
9. The Oxford Guide to Writing and Speaking, John Seely, Oxford.
10. English Language Communication Skills - Lab Manual cum Workbook by Rajesh Kumar Singh, Cengage learning India Pvt Limited – 2018
11. The 7 habits of highly effective people by Stephen R Covey, Simon & Schuster – 2020
12. 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			

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ – ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

Course Title:	**ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**		
Course Code:	**P22KSK107/207**	**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	**15 hours**	**Credits**	**01**

Course Objectives : ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

The course (P22KSK107/207) will enable the students,

೧. ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಾಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

೨. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಹಯಿಸುವುದು.

೩. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಾಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.

೪. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.

೫. ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process – General Instructions):

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

೧. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

೨. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು – ಅಂದರೆ ಕವಿ–ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.

೩. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

Module-1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು (03 hours of pedagogy)

೧. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ – ಹಂಪ ನಾಗರಾಜಯ್ಯ

೨. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ – ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ

೩. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ – ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೋ. ವಿ. ಕೇಶವಮೂರ್ತಿ

Module-2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ (03 hours of pedagogy)

೧. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.

೨. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು

ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ – ಕನಕದಾಸರು

೩. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು – ಶಿಶುನಾಳ ಶರೀಫಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case

Module-3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ	**(03 hours of pedagogy)**
೧. ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು ೨. ಕುರುಡು ಕಾಂಚಾಣ: ದಾ.ರಾ. ಬೇಂದ್ರೆ ೩. ಹೊಸಬಾಳಿನ ಗೀತೆ: ಕುವೆಂಪು	
Module-4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ	**(03 hours of pedagogy)**
೧. ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ – ಎ ಎನ್ ಮೂರ್ತಿರಾವ್ ೨. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ: ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ	
Module-5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ	**(03 hours of pedagogy)**
೧. ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ ೨. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ	

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಪರಿಣಾಮಗಳು (Course Outcomes)

CO1: ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.

CO2: ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಫೂರ್ತಿ ಮೂಡತ್ತದೆ.

CO3: ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯು ಹೆಚ್ಚಾಗುತ್ತದೆ.

CO4: ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ.

CO4: ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

Assessment Details (both CIE and SEE)

methods of CIE – MCQ, Quizzes, Open book test, Seminar or micro project)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is50%. The student has to obtain a minimum of 40% marks individually both in CIE and 35% marks in SEE to pass. Theory Semester End Exam (SEE) is conducted for 50 marks (01 hour duration). Based on this grading will be awarded.

Continuous Internal Evaluation:

Two Tests each of **40 Marks (duration 01 hour)**
Two assignments each of **10 Marks**

CIE methods / question paper is designed to attain the different levels of Blomm's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ – Semester end Exam

SEE will be conducted as per the scheduled timetable, with common question papers for the subject,

1. The question paper will have 25 questions. Each question is set for 02 marks.
2. SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ: University Priscribed Textbook

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ಡಾ. ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಎಲ್. ತಿಮ್ಮೇಶ,
ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

ಬಳಕೆ ಕನ್ನಡ - Balake Kannada (Kannada for Usage)

ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ (Prescribed Textbook to Learn Kannada)

Course Title:	**ಬಳಕೆ ಕನ್ನಡ**		
Course Code:	**P22KBK107/207**	**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	**15 hours**	**Credits**	**01**

Course objectives: ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು

The course (P22KBK107/207) will enable the students,

1. To create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conservation.
5. To know about Karnataka state and its language, literature and General information about this state.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (**Teaching-Learning Process – General Instructions):**

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

೧. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರು ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.

೨. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್‌ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.

೩. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.

೪. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.

೫. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module-1 **(03 hours of pedagogy)**

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activites
3. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು –Personal Pronouns, Possessive Forms, Interrogative words

Module-2 **(03 hours of pedagogy)**

೧. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು – Possessive forms of nouns, dubitive question and Relative nouns

೨. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative and Colour Adjectives, Numerals

೩. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು – ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case

Module-3 **(03 hours of pedagogy)**

೧. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು – Dative Cases, and Numerals

೨. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು – Ordinal numerals and Plural markers

೩. ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು – Defective / Negative Verbs and Colour Adjectives

Module-4 **(03 hours of pedagogy)**

೧. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences)

೨. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication

೩. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು – Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs

೪. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ – Comparative, Relationship, Identification and Negation Words

Module-5 **(03 hours of pedagogy)**

೧. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು –Differint types of forms of Tense, Time and Verbs

೨. ದ್, –ತ್, –ತು, –ಇತು, –ಆಗಿ, –ಅಲ್ಲ, –ಗ್, –ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ – Formation of past, Future and Present Tense Sentences with Verb Forms

೩. Kannada Vocabulary List : ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು – Kannada Words in Conversation

Course Outcomes (Course Skill Set):
ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯದ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು :

At the end of the Couse, The Students will be able

CO1: To understand the necessity of learning of local language for comfortable life.

CO2: To Listen and understand the Kannada language properly.

CO3: To speak, read and write Kannada language as per requirement.

CO4: To communicate (converse) in Kannada language in their daily life with kannada speakers.

CO5: To speak in polite conservation.

(**Assessment Details – both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and aearned the credits allotted to each subject / course if the student secures not less than 35% (18 Marks out of 50) in the semester – end examination (SEE), and a minimum of 40% (40 maeks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:
Two Tests each of **40 Marks (duration 01 hour)**
Two assignments each of **10 Marks**

CIE methods / question paper is designed to attain the different levels of Blomm's taxonomy as per the outcome defined for the course.

ಸೆಮಿಸ್ಟರ್ ಅಂತ್ಯದ ಪರೀಕ್ಷೆಯು ಈ ಕೆಳಗಿನಂತಿರುತ್ತದೆ – Semester end Exam (SEE)

SEE will be conducted as per the scheduled timetable, with common question papers for the subject,

1. The question paper will have 25 questions. Each question is set for 02 marks.
2. SEE Pattern will be in MCQ Model for 50 marks. Duration of the exam is 01 hour.

ಪಠ್ಯ ಪುಸ್ತಕ (Text book) :

ಬಳಕೆ ಕನ್ನಡ
ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,
ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಾಂಗ,
ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

Indian Constitution

Course Title:	**Indian Constitution**		
Course Code:	**P22ICO107/207**	**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	**15 hours**	**Credits**	**01**

Course objectives :

The course **INDIAN CONSTITUTION (P22ICO107/207)** will enable the students,

1. To know about the basic structure of Indian Constitution.
2. To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

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: Teachers shall adopt suitable pedagogy for effective teaching – learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

I. Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion.

II. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students in theoretical applied and practical skills.

Module-1 (03 hours of pedagogy)

Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.

Module-2 (03 hours of pedagogy)

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. Building.

Module-3 (03 hours of pedagogy)

Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive: Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.

Module-4 (03 hours of pedagogy)

Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.

Module-5	**(03 hours of pedagogy)**
State Executive and Governer, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.	

Course outcome (Course Skill Set)

At the end of the course P22ICO107/207 the student will be able to:

CO1 Analyse the basic structure of Indian Constitution.
CO2 Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.
CO3 know about our Union Government, political structure & codes, procedures.
CO4 Understand our State Executive & Elections system of India.
CO5 Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks that is 20 marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE and SEE taken together

Continuous Internal Evaluation:

Two Tests each of **40 Marks (duration 01 hour**)
Two assignments each of **10 Marks**

The average of two tests, two assignments, and quiz/seminar/group discussion will be out of 50 marks

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per theoutcome defined for the course.

Semester End Examination:

SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject.

1. The question paper will have 25 questions. Each question is set for 02 marks.
2. SEE Pattern will be in MCQ Model (Multiple Choice Questions) for 50 marks. Duration of the examination is 01 Hour.

Suggested Learning Resources:

Textbook:

1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.

Course Title:	**Innovation and Design Thinking**		
Course Code:	**P22IDT108/208**	**CIE Marks**	**50**
Teaching Hours/Week (L:T:P:S)	**0:2:0:0**	**SEE Marks**	**50**
Total Hours of Pedagogy	**25 hours**	**Total Marks**	**100**
Credits	**01**	**Exam Hours 02**	**02**

Course Category: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.

Course objectives:

- To explain the concept of design thinking for product and service development
- To explain the fundamental concept of design thinking
- To discuss the methods of implementing design thinking in the real world.

Module-1

Understanding Design Thinking
Definition of design - Design Vs Engineering Design– Difference between Design and Engineering Design– The General Design process Model – Design to Design thinking - Time line of Design thinking.

Module-2

Features of Design Thinking
Venn diagram of design thinking– Design thinking resources – Design thinking process Models – Design thinking methodologies

Module-3

Models to Do Design Thinking
Different kinds of thinking – 5 Stage d.School Process - 5 stages of Stanford – Empathize – Define- Ideate – Prototype – Test – Iterate - Applications of Design Thinking

Module-4

Design thinking for Engineering - Concept models for comparing design thinking and engineering systems thinking - The Distinctive Concept Model - The Comparative Concept Model - The Inclusive Concept Model - The Integrative Concept Model.

Module-5

Design Thinking Tools and Methods - Purposeful Use of Tools and Alignment with Process - What Is: Visualization - What Is: Journey Mapping - What Is: Value Chain Analysis - What Is: Mind Mapping - What If: Brainstorming - What If: Concept Development - What Wows: Assumption Testing - What Wows: Rapid Prototyping - What Works: Customer Co-Creation - What Works: Learning Launch.

Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Understanding Design Thinking process	L2
CO2	Appreciate various design process procedure	L2
CO3	Generate and develop design ideas through different Technique.	L2
CO4	Identify the significance of reverse Engineering to Understand products	L3
CO5	Practice the methods, processes, and tools of Design Thinking	L2

Suggested Learning Resources:

Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design",Cengagelearning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage",Harvard Business Press , 2009.

References:

1. Jake knapp, John keratsky and Braden kowitz "Sprint how to solve big problems and test new ideas in just five days"
2. Tim Brown "Change by design"
3. Steve Krug "Don't make me think; Revisited"
4. Roger martin "The design of Business"
5. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", CengageLearning, SecondEdition, 2011.
6. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Businessor Design School", John Wiley & Sons 2013.
7. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011

Scientific Foundations for Health

Course Title:	**Scientific Foundations for Health**		
Course Code:	**P22SFH108/208**	**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	**15 hours**	**Credits**	**01**

Course objectives

The course Scientific Foundations of Health (P22SFH108/208) will enable the students,

1. To know about Health and wellness (and its Beliefs) & It's balance for positive mindset.
2. To build the healthy lifestyles for good health for their better future.
3. To Create a Healthy and caring relationships to meet the requirements of good/social/positive life.
4. To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
5. To Prevent and fight against harmful diseases for good health through positive mindset

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:

Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools.

(i) Direct instructional method (Low/Old Technology), (ii) Flipped classrooms (High/advanced Technological tools), (iii) Blended learning (Combination of both), (iv) Enquiry and evaluation based learning, (v) Personalized learning, (vi) Problems based learning through discussion, (vii) Following the method of expeditionary learning Tools and techniques, (viii) Use of audio visual methods.

Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.

Module-1 **(03 hours of pedagogy)**

Good Health & It's balance for positive mindset: Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.

Module-2 **(03 hours of pedagogy)**

Building of healthy lifestyles for better future: Developing healthy diet for good health, Food & health, Nutritional guidelines for good health, Obesity & overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries.

Module-3 **(03 hours of pedagogy)**

Creation of Healthy and caring relationships: Building communication skills, Friends and friendship - Education, the value of relationship and communication skills, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering.

Module-4	**(03 hours of pedagogy)**
Avoiding risks and harmful habits: Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction develops, Types of addictions, influencing factors of addictions, Differences between addictive people and non-addictive people & their behaviors. Effects of addictions Such as..., how to recovery from addictions.	
Module-5	**(03 hours of pedagogy)**
Preventing & fighting against diseases for good health: How to protect from different types of infections, How to reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Quality of life, Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status.	

Course outcome (Course Skill Set):

At the end of the course Scientific Foundations of Health (P22SFH108/208) the student will be able to:

CO1 To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive Mindset.

CO2 Develop the healthy lifestyles for good health for their better future.

CO3 Build a Healthy and caring relationships to meet the requirements of good/social/positive life.

CO4 To learn about Avoiding risks and harmful habits in their campus and outside the campus for Their bright future.

CO5 Prevent and fight against harmful diseases for good health through positive mindset.

Suggested Learning Resources:

Textbook:

1. **"Scientific Foundations of Health"** – Study Material Prepared by Dr. L Thimmesha, Published in VTU University Website.
2. **"Scientific Foundations of Health"**, (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022.
3. **Health Psychology** - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.

Reference Books:

1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Rutledge 711 Third Avenue, New York, NY 10017.
2. HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press.
3. SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials / notes.
4. Scientific Foundations of Health (Health & Wellness) - General Books published for university and colleges references by popular authors and published by the reputed publisher.

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
1. To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.	3											1		
2. Develop the healthy lifestyles for good health for their better future.	3											1		
3. Build a Healthy and caring relationships to meet the requirements of good/social/positive life.	3					1				2		1		
4. To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.	3											1		
5. Prevent and fight against harmful diseases for good health through positive mindset.	3											1		

Social Innovation

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

SEMESTER - II

Course Code:	**P22SI209**	**Credits:**	**00**
Teaching Hours/Week (L:T:P):	**1:0:1**	**CIE Marks:**	**100**
Total Number of Teaching Hours:	**24**	**SEE Marks:**	**-**

Course objectives:

1) To turn ideas into working prototypes showcasing their technical proficiency.
2) Students will learn how to design and prototype their ideas.
3) Through a series of lectures and exercises students will learn and practice different prototyping techniques.

Unit - 1: Foundations of Social Innovation **6 Hrs**

- **Session 1: Introduction to Sustainable Development Goals (SDGs)** – 2 Hrs
  Overview of SDGs and an introduction to how design thinking can address global challenges.
- **Session 2: Fundamentals of Research for Social Impact** – 2 Hrs
  Covers research types, methodologies, and strategies for effective social innovation research.
- **Session 3: Stakeholder Mapping and Analysis** – 2 Hrs
  Understanding stakeholders, mapping them, and identifying their roles in social innovation.

Unit - 2: Field Engagement and Problem Framing **6 Hrs**

- **Session 4: Interview Techniques and Data Collection** – 2 Hrs
  Developing skills in interview preparation, questioning, and field observation.
- **Session 5: Field Visit and Practical Application** – 4 Hrs
  Real-world engagement with stakeholders to apply theoretical knowledge in a practical setting.
- **Session 6: Continuous Internal Evaluation I - Problem Validation** – 2 Hrs
  Teams submit research mind maps, validate case study problems, and discuss project ideas.

Unit - 3: Problem Solving and Idea Development **6 Hrs**

- **Session 7: Analyzing and Defining the Problem** – 2 Hrs
  Using problem analysis tools to identify root causes and structure problem definitions.
- **Session 8: Creative Ideation and Concept Generation** – 2 Hrs
  Techniques for generating innovative ideas and making strategic decisions.
- **Session 9: Business and Value Proposition Canvases** – 2 Hrs
  Introduction to business modeling, focusing on customer needs, pain points, and value creation.

Unit - 4: Prototype Development and Presentation **6 Hrs**

- **Session 10: Idea Pitching** – 2 Hrs
  Students pitch problem definitions and solutions, refining ideas for further development.
- **Session 11: Prototype Design and Concept Refinement** – 2 Hrs
  Concept development, materials selection, and building early-stage prototypes.
- **Session 12: Advanced Prototyping Techniques** – 2 Hrs
  Hands-on prototype development, exploring tools and techniques for refinement.

Students will design prototypes addressing real-world societal needs, create a compelling pitch deck for stakeholders, and present their innovative solutions for social impact