

BE SCHEME & SYLLABUS

First Year (I and II Semester)

With effect from 2022-23



**Mechanical Engineering
Stream**



ST JOSEPH ENGINEERING COLLEGE

AN AUTONOMOUS INSTITUTION

Vamanjoor, Mangaluru - 575028

MOTTO

Service & Excellence

VISION

To be a global premier Institution of professional education and research.

MISSION

- Provide opportunities to deserving students of all communities, the Christian students in particular for quality professional education.
- Design and deliver curricula to meet the national and global changing needs through student-centric learning methodologies.
- Attract, nurture and retain the best faculty and technical manpower.
- Consolidate the state-of-art infrastructure and equipment for teaching and research activities.
- Promote all round personality development of the students through interaction with alumni, academia and industry.
- Strengthen the Educational Social Responsibilities (ESR) of the institution.



ST JOSEPH ENGINEERING COLLEGE

An Autonomous Institution
Vamanjoor, Mangaluru - 575028

Affiliated to VTU – Belagavi & Recognized by AICTE New Delhi
NBA – Accredited: B.E.(CSE,ECE,EEE, ME and CIV) & MBA
NAAC – Accredited with A+

B.E. SCHEME & SYLLABUS

Mechanical Engineering Stream

(With effect from 2022-23)

First Year
(I and II Semester)

AUTONOMY AND ACCREDITATION

St Joseph Engineering College (SJEC) is an Autonomous Institute under Visvesvaraya Technological University (VTU), Belagavi, Karnataka State, and is recognized by the All-India Council for Technical Education (AICTE), New Delhi. SJEC is registered under the trust “Diocese of Mangalore, Social Action Department”.

The SJEC has been conferred Fresh Autonomous Status from the Academic Year 2021-22. The college was granted autonomy by the University Grants Commission (UGC) under the UGC Scheme for Autonomous Colleges 2018 and conferred by VTU. The UGC Expert Team had visited the college on 28-29 November 2021 and rigorously assessed the college on multiple parameters. The fact that only a handful of engineering colleges in the state have attained Autonomous Status adds to the college’s credibility that has been on a constant upswing. Autonomy will make it convenient for the college to design curricula by recognizing the needs of the industry, offering elective courses of choice and conducting the continuous assessment of its students.

At SJEC, the Outcome-Based Education (OBE) system has been implemented since 2011. Owing to OBE practised at the college, SJEC has already been accredited by the National Board of Accreditation (NBA). Five of the UG programs, namely Computer Science & Engineering, Mechanical Engineering, Electronics and Communication Engineering, Electrical & Electronics Engineering and Civil Engineering and MBA programs, have accreditation from the NBA.

Also, SJEC has been awarded the prestigious A+ grade by the National Assessment and Accreditation Council (NAAC) for five years. With a Cumulative Grade Point Average (CGPA) of 3.39 on a 4-point scale, SJEC has joined the elite list of colleges accredited with an A+ grade by NAAC in its first cycle. The fact that only a small percentage of the Higher Education Institutions in India have bagged A+ or higher grades by NAAC adds to the college’s credibility that has been on a constant upswing.

The college is committed to offering quality education to all its students, and the accreditation by NAAC and NBA reassures this fact. True to its motto of “Service and Excellence”, the college’s hard work has resulted in getting this recognition, which has endorsed the academic framework and policies that the college has been practising since its inception. The college has been leveraging a flexible choice-based academic model that gives students the freedom to undergo learning in respective disciplines and a transparent and continuous evaluation process that helps in their holistic development.

CONTENTS

SI No	SUBJECTS	Page No
1	Scheme: I Semester B.E. (Physics Group)	05
2	Scheme: II Semester B.E. (Chemistry Group)	08
3	Scheme: I Semester B.E. (Chemistry Group)	10
4	Scheme: II Semester B.E. (Physics Group)	13
5	22MATM11: Mathematics for Mechanical Engineering Stream-I	15
6	22MATM21: Mathematics for Mechanical Engineering Stream-II	18
7	22PHYM12/22: Physics for Mechanical Engineering Stream	21
8	22CHEM12/22: Chemistry for Mechanical Engineering Stream	25
9	22EME13/23: Elements of Mechanical Engineering	28
10	22CED13/23: Computer Aided Engineering Drawing	31
	Engineering Science Courses (ESC)	
11	22ESC141/241: Introduction to Civil Engineering	33
12	22ESC142/242: Introduction to Electrical Engineering	36
13	22ESC143/243: Introduction to Electronics Engineering	38
14	22ESC144/244: Introduction to Mechanical Engineering	41
15	22ESC145/245: Introduction to C Programming	44
	Emerging Technology Courses (ETC)	
16	22ETC15A/25A: Introduction to Nanotechnology	47
17	22ETC15B/25B: Renewable Energy Sources	50
18	22ETC15C/25C: Emerging Applications of Biosensors	52
19	22ETC15D/25D: Introduction to Internet of Things (IoT)	54
20	22ETC15E/25E: Waste Management	56
21	22ETC15F/25F: Introduction to Cyber Security	58
	Programming Language Course (PLC)	
22	22PLC15A/25A: Introduction to Web Programming	60
23	22PLC15B/25B: Introduction to Python Programming	64
24	22PLC15C/25C: Basics of Java Programming	68
25	22PLC15D/25D: Introduction to C++ Programming	71
26	22ENG16: Communicative English	74
27	22PWS26: Professional Writing Skills in English	76

28	22KSK17 / 27: Samskrutika Kannada	78
29	22KBK17 / 27: BalakeKannada	81
30	22ICO17 / 27: Indian Constitution	83
31	22SFH18/28: Scientific Foundations of Health	85
32	22PFT18/28: Prototype Fabrication and Testing	87
33	22ITM19/29: Industry Oriented Training: Mathematical Aptitude Skills	89
34	22ITP19/29: Industry Oriented Training- Problem Solving Skills	91

St Joseph Engineering College Mangaluru
Autonomous Institution

Scheme of Teaching and Examinations-2022

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

I Semester M E S (Mechanical Engineering Stream)

Physics Group

Sl.No	Course and Course Code		Course title	TD/PSB	Teaching Hours/Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	*ASC(IC)	**22MATM11	Mathematics for Mechanical Engineering Stream-I	Maths	2	2	2	03	50	50	100	04
2	#ASC(IC)	22PHYM12	Physics for Mechanical Engineering	Physics	2	2	2	03	50	50	100	04
3	ESC	22EME13	Elements of Mechanical Engineering	Mechanical	2	0	2	03	50	50	100	03
4	ESC-I	22ESC14x	Engineering Science Course-I	Respective Engg Dept	3	0	0	03	50	50	100	03
5	ETC-I	22ETC15x	Emerging Technology Course-I	Any Dept	3	0	0	03	50	50	100	03
6	AEC	22ENG16	Communicative English	Humanities	1	0	0	01	50	50	100	01
7	HSMC	22KSK17 22KBK17	Sanskrutika Kannada/ BalakeKannada	Humanities	1	0	0	01	50	50	100	01
8	AEC/SDC	22PFT18	Prototype Fabrication and Testing	Any Dept	0	0	2	03	50	50	100	01
9	AEC/SDC	22ITM19	Industry Oriented Training – (Mathematical Aptitude Skills)	COM	-	2	-	02	50	-	50	-
TOTAL					14	6	8		450	400	850	20

TD/PSB- Teaching Department / Paper Setting Board, **ASC-**Applied Science Course, **ESC-** Engineering Science Courses, **ETC-** Emerging Technology Course, **AEC-** Ability Enhancement Course, **HSMC-**Humanity and Social Science and Management Course, **SDC-** Skill Development Course, **CIE-**Continuous Internal Evaluation, **SEE-** Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

<p>Credit Definition:</p> <p>1-hour Lecture (L) per week = 1 Credit 2-hours Tutorial (T) per week = 1 Credit 2-hours Practical / Drawing (P) per week = 1 Credit</p>	<p>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 Session 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</p>
<p>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.</p>	
<p>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.</p>	
<p>*-22MATM11 Shall have the 03 hours of theory examination (SEE), however, practical sessions question shall be included in the theory question papers. ** The mathematics subject should be taught by a single faculty member per division, with no sharing of the course(subject)module-wise by different faculty members. #-22PHYM12 SEE shall have the 03 hours of theory examination. ESC or ETC of 03 credits Courses shall have only a theory component (L:T:P=3:0:0) or if the nature of course required practical learning then the syllabus shall be designed as an Integrated course (L:T:P= 2:0:2). All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ.</p>	

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC141	Introduction to Civil Engineering	3	0	0	22ETC15A	Introduction to Nano Technology	3	0	0
22ESC142	Introduction to Electrical Engineering	3	0	0	22ETC15B	Renewable Energy Sources	3	0	0
22ESC143	Introduction to Electronics Engineering	3	0	0	22ETC15C	Emerging Applications of Biosensors	3	0	0
22ESC144	Introduction to Mechanical Engineering	3	0	0	22ETC15D	Introduction to Internet of Things (IOT)	3	0	0
22ESC145	Introduction to C Programming	2	0	2	22ETC15E	Waste Management	3	0	0
					22ETC15F	Introduction to Cyber Security	3	0	0
(PLC-I) Programming Language Courses-I									
Code	Title	L	T	P					
22PLC15A	Introduction to Web Programming	2	0	2					
22PLC15B	Introduction to Python Programming	2	0	2					
22PLC15C	Basics of JAVA programming	2	0	2					
22PLC15D	Introduction to C++ Programming	2	0	2					
The course 22ESC145/245, Introduction to C Programming, and all courses under PLC and ETC groups can be taught by ANY DEPARTMENT									

- The student has to select one course from the ESC-I group.
- ME stream Students shall opt for any one of the courses from the ESC-I group **except, 22ESC144-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.

St Joseph Engineering College Mangaluru

Autonomous Institution

Scheme of Teaching and Examinations-2022

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

II Semester M E S (Mechanical Engineering Stream)			Chemistry Group (For students attended 1 st semester under Physics Group)									
Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	*ASC(IC)	**22MATM21	Mathematics for ME Stream-II	Maths	2	2	2	03	50	50	100	04
2	#ASC(IC)	22CHEM22	Chemistry for ME Stream	Chemistry	2	2	2	03	50	50	100	04
3	ESC	22CED23	Computer-Aided Engineering Drawing	Civil/MechEngg dept	2	0	2	03	50	50	100	03
4	ESC-II	22ESC24x	Engineering Science Course-II	RespectiveEngg. Dept	3	0	0	03	50	50	100	03
5	PLC-II	22PLC25x	Programming Language Course-II	Any Dept	2	0	2	03	50	50	100	03
6	AEC	22PWS26	Professional Writing Skills in English	Humanities	1	0	0	01	50	50	100	01
7	HSMC	22ICO27	Indian Constitution	Humanities	1	0	0	01	50	50	100	01
8	HSMS	22SFH28	Scientific Foundations of Health	Any Dept	1	0	0	01	50	50	100	01
9	AEC/SDC	22ITP29	Industry Oriented Training – (Problem Solving Skills)	Any Dept	-	2	-	02	50	-	50	-
TOTAL					14	6	8		450	400	850	20

TD/PSB- Teaching Department / Paper Setting Board, **ASC-**Applied Science Course, **ESC-** Engineering Science Courses, **ETC-** Emerging Technology Course, **AEC-** Ability Enhancement Course, **HSMC-**Humanity and Social Science and Management Course, **SDC-** Skill Development Course, **CIE-**Continuous Internal Evaluation, **SEE-** Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

*-22MATM21 Shall have the 03 hours of theory examination (SEE), however, practical sessions question shall be included in the theory question papers.

** The mathematics subject should be taught by a single faculty member per division, with no sharing of the course(subject)module-wise by different faculty members. #-22CHEM22- SEE shall have the 03 hours of theory examination.

ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P=3:0:0) or if the nature the of course required experimental learning, then syllabus shall be designed as an Integrated course (L:T:P= 2:0:2), All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ.

(ESC-II) Engineering Science Courses-II					(ETC-II) Emerging Technology Courses-II				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC241	Introduction to Civil Engineering	3	0	0	22ETC25A	Introduction to Nano Technology	3	0	0
22ESC242	Introduction to Electrical Engineering	3	0	0	22ETC25B	Renewable Energy Sources	3	0	0
22ESC243	Introduction to Electronics Engineering	3	0	0	22ETC25C	Emerging Applications of Biosensors	3	0	0
22ESC244	Introduction to Mechanical Engineering	3	0	0	22ETC25D	Introduction to Internet of Things (IOT)	3	0	0
22ESC245	Introduction to C Programming	2	0	2	22ETC25E	Waste Management	3	0	0
					22ETC25F	Introduction to Cyber Security	3	0	0
(PLC-II) Programming Language Courses-II									
Code	Title	L	T	P					
22PLC25A	Introduction to Web Programming	2	0	2					
22PLC25B	Introduction to Python Programming	2	0	2					
22PLC25C	Basics of JAVA programming	2	0	2					
22PLC25D	Introduction to C++ Programming	2	0	2					
The course 22ESC145/245, Introduction to C Programming, and all courses under PLC and ETC					groups can be taught by ANY DEPARTMENT				

- The student has to select one course from the ESC-II group.
- Mechanical Engineering Stream Students shall opt for any one of the courses from the ESC-II group **except, 22ESC244-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-II or PLC-II 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.

St Joseph Engineering College Mangaluru

Autonomous Institution

Scheme of Teaching and Examinations-2022

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

I Semester M E S (Mechanical Engineering Stream)

Chemistry Group

Sl.No	Course and Course Code		Course title	TD/PSB	Teaching Hours/Week			Examination			Credits	
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks		Total Marks
					L	T	P					
1	*ASC(IC)	**22MATM11	Mathematics for ME Stream -I	Maths	2	2	2	03	50	50	100	04
2	#ASC(IC)	22CHEM12	Chemistry for ME Stream	Chemistry	2	2	2	03	50	50	100	04
3	ESC	22CED13	Computer-Aided Engineering Drawing	Civil/Mech Engg Dept	2	0	2	03	50	50	100	03
4	ESC-I	22ESC14x	Engineering Science Course-I	Respective Engg Dept	3	0	0	03	50	50	100	03
5	PLC-I	22PLC15x	Programming Language Course-I	Any Dept	3	0	0	03	50	50	100	03
6	AEC	22PWS16	Professional Writing Skills in English	Humanities	1	0	0	01	50	50	100	01
7	HSMC	22ICO17	Indian Constitution	Humanities	1	0	0	01	50	50	100	01
8	HSMC	22SFH18	Scientific Foundations of Health	Any Dept	1	0	0	02	50	50	100	01
9	AEC/SDC	22ITP19	Industry Oriented Training – I (Problem Solving Skills)	COM	-	2	-	02	50	-	50	-
TOTAL					15	6	6		450	400	850	20

TD/PSB- Teaching Department / Paper Setting Board, **ASC-**Applied Science Course, **ESC-** Engineering Science Courses, **ETC-** Emerging Technology Course, **AEC-** Ability Enhancement Course, **HSMC-**Humanity and Social Science and Management Course, **SDC-** Skill Development Course, **CIE-**Continuous Internal Evaluation, **SEE-** Semester End Examination, **IC –** Integrated Course (Theory Course Integrated with Practical Course)

<p>Credit Definition:</p> <p>1-hour Lecture (L) per week = 1 Credit</p> <p>2-hours Tutorial (T) per week = 1 Credit</p> <p>2-hours Practical / Drawing (P) per week = 1 Credit</p>	<p>04-Credits courses are to be designed for 50 hours of Teaching-Learning Session</p> <p>04-Credits (IC) are to be designed for 40 hours' Theory and 12-14 hours of Practical Session</p> <p>03-Credits courses are to be designed for 40 hours of Teaching-Learning Session</p> <p>02- Credits courses are to be designed for 25 hours of Teaching-Learning Session</p> <p>01-Credit courses are to be designed for 12-15 hours of Teaching-Learning sessions</p>
<p>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.</p>	
<p>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.</p>	
<p>*-22MATM11 Shall have the 03 hours of theory examination (SEE), however, practical sessions question shall be included in the theory question papers.</p> <p>** The mathematics subject should be taught by a single faculty member per division, with no sharing of the course(subject)module-wise by different faculty members.</p> <p>#-22PCHEM12 SEE shall have the 03 hours of theory examination.</p> <p>ESC or ETC of 03 credits Courses shall have only a theory component (L:T:P=3:0:0) or if the nature of course required practical learning then syllabus shall be designed as an Integrated course (L:T:P= 2:0:2).</p> <p>All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ.</p>	

(ESC-I) Engineering Science Courses-I					(ETC-I) Emerging Technology Courses-I				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC141	Introduction to Civil Engineering	3	0	0	22ETC15A	Introduction to Nano Technology	3	0	0
22ESC142	Introduction to Electrical Engineering	3	0	0	22ETC15B	Renewable Energy Sources	3	0	0
22ESC143	Introduction to Electronics Engineering	3	0	0	22ETC15C	Emerging Applications of Biosensors	3	0	0
22ESC144	Introduction to Mechanical Engineering	3	0	0	22ETC15D	Introduction to Internet of Things (IOT)	3	0	0
22ESC145	Introduction to C Programming	2	0	2	22ETC15E	Waste Management	3	0	0
					22ETC15F	Introduction to Cyber Security	3	0	0
(PLC-I) Programming Language Courses-I									
Code	Title	L	T	P					
22PLC15A	Introduction to Web Programming	2	0	2					
22PLC15B	Introduction to Python Programming	2	0	2					
22PLC15C	Basics of JAVA programming	2	0	2					
22PLC15D	Introduction to C++ Programming	2	0	2					
The course 22ESC145/245, Introduction to C Programming, and all courses under PLC and ETC groups can be taught by ANYDEPARTMENT									

- The student has to select one course from the ESC-I group.
- ME Students shall opt for any one of the courses from the ESC-I group **except, 22ESC144-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.

St Joseph Engineering College Mangaluru

Autonomous Institution

Scheme of Teaching and Examinations-2022

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

II Semester MES (Mechanical Engineering Stream)			Physics Group (For students attended 1 st semester under Chemistry Group)									
Sl. No	Course and Course Code		Course Title	TD/PSB	Teaching Hours/Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	*ASC(IC)	**22MATM21	Mathematics for ME Stream-II	Maths	2	2	2	03	50	50	100	04
2	#ASC(IC)	22PHYM22	Physics for ME Stream	Physics	2	2	2	03	50	50	100	04
3	ESC	22EME23	Elements of Mechanical Engineering	Mech Engg	2	0	2	03	50	50	100	03
4	ESC-II	22ESC24x	Engineering Science Course-II	Respective Engg. Dept	3	0	0	03	50	50	100	03
5	ETC-II	22ETC25x	Emerging Technology Course-II	Any Dept	2	0	2	03	50	50	100	03
6	AEC	22ENG26	Communicative English	Humanities	1	0	0	01	50	50	100	01
7	HSMC	22KSK27/ 22KKBK27	Sanskritika Kannada/ BalakeKannada	Humanities	1	0	0	01	50	50	100	01
8	AEC/SDC	22PFT28	Prototype Fabrication and Testing	Any Dept	0	0	2	03	50	50	100	01
9	AEC/SDC	22ITM29	Industry Oriented Training – (Mathematical Aptitude Skills)	Any Dept	-	2	-	02	50	-	50	-
TOTAL					13	6	10		450	400	850	20

TD/PSB- Teaching Department / Paper Setting Board, **ASC-**Applied Science Course, **ESC-** Engineering Science Courses, **ETC-** Emerging Technology Course, **AEC-** Ability Enhancement Course, **HSMC-**Humanity and Social Science and Management Course, **SDC-** Skill Development Course, **CIE-**Continuous Internal Evaluation, **SEE-** Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course).

*-22MATM21 Shall have the 03 hours of theory examination (SEE), however, practical sessions question shall be included in the theory question papers.
 ** The mathematics subject should be taught by a single faculty member per division, with no sharing of the course(subject)module-wise by different faculty members. #-22PHYM22- SEE shall have the 03 hours of theory examination.
 ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P=3:0:0) or if the nature the of course required experimental learning, then syllabus shall be designed as an Integrated course (L:T:P= 2:0:2), All 01 Credit- courses shall have the SEE of 01 hours duration and the pattern of the question paper shall be MCQ

(ESC-II) Engineering Science Courses-II					(ETC-II) Emerging Technology Courses-II				
Code	Title	L	T	P	Code	Title	L	T	P
22ESC241	Introduction to Civil Engineering	3	0	0	22ETC25A	Introduction to Nano Technology	3	0	0
22ESC242	Introduction to Electrical Engineering	3	0	0	22ETC25B	Renewable Energy Sources	3	0	0
22ESC243	Introduction to Electronics Engineering	3	0	0	22ETC25C	Emerging Applications of Biosensors	3	0	0
22ESC244	Introduction to Mechanical Engineering	3	0	0	22ETC25D	Introduction to Internet of Things (IOT)	3	0	0
22ESC245	Introduction to C Programming	2	0	2	22ETC25E	Waste Management	3	0	0
					22ETC25F	Introduction to Cyber Security	3	0	0
(PLC-II) Programming Language Courses-II									
Code	Title	L	T	P					
22PLC25A	Introduction to Web Programming	2	0	2					
22PLC25B	Introduction to Python Programming	2	0	2					
22PLC25C	Basics of JAVA programming	2	0	2					
22PLC25D	Introduction to C++ Programming	2	0	2					
The course 22ESC145/245, Introduction to C Programming, and all courses under PLC and ETC groups can be taught by ANY DEPARTMENT									

- The student has to select one course from the ESC-II group.
- ME Students shall opt for any one of the courses from the ESC-II group **except, 22ESC244- 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-II or PLC-II 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.

Course Title:	Mathematics for Mechanical Engineering stream-I		
Course Code:	22MATM11	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:2:2	SEE	3 hours
Total Hours of Pedagogy	40 hours Theory + 10 Lab slots	Credits	04
<p>Course objectives: The goal of the course is to</p> <ul style="list-style-type: none"> ● Articulate the importance of calculus associated with one variable and two variables for Mechanical engineering. ● Analyze Mechanical engineering problems applying Ordinary Differential Equations. ● Apply the knowledge of higher order differential equations to mechanical systems. ● Develop the knowledge of Linear Algebra to solve the system of equations. 			
Module-1 Calculus		(8 hours)	
<p>Introduction to polar coordinates and curvature relating to mechanical engineering. Polar coordinates, Polar curves, angle between the radius vector and tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems. Applications: Applied Mechanics, Strength of Materials, Elasticity.</p>			
Module-2 Series Expansion and Multivariable Calculus		(8 hours)	
<p>Introduction to series expansion and partial differentiation in the field of mechanical engineering applications. Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule (restricted to $0^0, \infty^0, 1^\infty$) problems Partial differentiation: Total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems. Applications: Computation of stress and strain, Errors and approximations in manufacturing process, Estimating the critical points and extreme values, vector calculus.</p>			
Module-3 Ordinary Differential Equations (ODEs) of first order		(8 hours)	
<p>Introduction to first order ordinary differential equations pertaining to the applications for mechanical engineering. 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 on $\frac{1}{M}\left(\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}\right)$. Application of ODE's – Orthogonal trajectories(polar form only.), 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 Applications: Applications of ODE;s : L- R circuits. Solvable for x and y.</p>			
Module-4 Ordinary Differential Equations of higher order		(8 hours)	
<p>Importance of higher-order ordinary differential equations in Mechanical Engineering applications. Higher-order linear ODE's with constant coefficients - Inverse differential operator (exponential, polynomial, trigonometric functions) method of variation of parameters, Cauchy's and Legendre differential equations. Problems. Applications: Applications to oscillations of a spring, Mechanical systems and Transmission lines.</p>			
Module-5 Linear Algebra		(8 hours)	
<p>Introduction of liner algebra related to Mechanical Engineering applications. 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. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.</p>			

Applications: Solution of a system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.

List of Laboratory experiments (2 hours/week) 10 lab sessions + 2 Lab Assessment

Suggested Software: MATLAB

1. 2D plots for Cartesian and polar curves
2. Finding angle between polar curves, curvature and radius of curvature of a given curve
3. Finding partial derivatives, Jacobian
4. Application of Maxima and Minima of two variable.
5. Taylor and Maclaurin Series and plotting the graph
6. Solution of first order differential equation and plotting the graphs
7. Solutions of Second order ordinary differential equations
8. Solution of a differential equation of variable coefficients
9. Numerical solution of system of linear equations, test for consistency, Solution of system of linear equations using Gauss-Seidel iteration.
10. Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.

Course Outcomes:

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

22MATM11.1	Apply the knowledge of calculus to solve problems related to polar curves.
22MATM11.2	Compute Taylor's, Maclaurin's series expansion for function of single variable and evaluating indeterminate forms
22MATM11.3	Use the notion of partial differentiation to compute rate of change multivariate functions
22MATM11.4	Classify the given first order differential equations and apply it to find orthogonal trajectories.
22MATM11.5	Analyze higher order linear differential equations as linear homogeneous, linear non homogeneous, with constant & variable coefficients and solve them.
22MATM11.6	Make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvectors

Semester End Examination(SEE):

The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 50

- The question paper will have Part A and Part B. Part A is Mandatory
- Part A has 10 short answer type questions of two mark each
- Part B has 10 Full questions. Each full question carries 16 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.

Students will have to answer 5 full questions, selecting one full question from each Module.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	Dr B.S. Grewal	Khanna Publishers	44th Edition, 2021
2	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10 th Edition, 2018

Reference Books				
1	Higher Engineering Mathematics	B.V.Ramana 11th Edition	Tata McGraw-Hill	2010
2	Engineering Mathematics	Srimanta Pal and Subodh C. Bhunia	Oxford University Press	3 rd Edition, 2016
3	A textbook of Engineering Mathematics	N.P Bali and Manish Goyal	Laxmi Publications	10 th Edition, 2022
4	Advanced Engineering Mathematics	C. Ray Wylie, Louis C. Barrett	McGraw – Hill Book Co., New York	6 th Edition, 2017
5	Engineering Mathematics for Semester I and II	Gupta C. B, Sing S. R and Mukesh Kumar	McGraw – Hill Book Co., new York	1 st Edition, 2015
6	Higher Engineering Mathematics	H.K. Dass and Er. Rajnish Verma	S Chand Publications	3 rd Edition, 2014
7	Calculus	James Stewart	Cengage Publications	7 th Edition, 2019
8	Linear Algebra and its Applications	David C Lay	Pearson Publishers	4 th Edition, 2018
9	Linear Algebra with Applications	Gareth Williams	Jones Bartlett Publishers Inc.	6 th Edition, 2017

Web links and Video Lectures (e-Resources):

- <https://www.youtube.com/watch?v=ixDGaEqWuA0>
- <https://youtu.be/3d6DsjlBzJ4>
- <https://www.youtube.com/watch?v=Gh48aOvWcxw&list=R>
- <https://archive.nptel.ac.in/courses/111/106/111106100/>
- https://youtu.be/7MmhoqvM9_Q
- <https://youtu.be/Mj3y5B5voNk>
- <https://www.youtube.com/watch?v=btOCUmJkrrg>
- <https://www.youtube.com/watch?v=OBhZvyhc8JQ>
- <https://www.youtube.com/watch?v=7vwDp94wEhg>
- <https://www.youtube.com/watch?v=HOXWRNuH3BE>
- <https://www.youtube.com/watch?v=oPkTasoJngA>
- <https://www.youtube.com/watch?v=gxy6VI1hEfs>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)											
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
22MATM11.1	3				2							
22MATM11.2		2			2							
22MATM11.3	3				2							
22MATM11.4		2			2							
22MATM11.5	3				2							
22MATM11.6		2			2							

1: Low 2: Medium 3: High

Course Title:	Mathematics for Mechanical Engineering Stream - II		
Course Code:	22MATM21	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:2:2	SEE Hours	03
Total Hours of Pedagogy	40 hours Theory + 10 Lab slots	Credits	04
<p>Course objectives: The goal of the course is to</p> <ul style="list-style-type: none"> • Articulate the importance of Integral calculus and Vector calculus essential for Mechanical engineering. • Analyze Mechanical engineering problems applying Partial Differential Equations. • Develop the knowledge of numerical methods and apply to solve transcendental and differential equations. 			
Module-1 Integral Calculus		(8 hours)	
<p>Introduction to Integral Calculus in Mechanical Engineering applications. Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems. Applications: Applications to find Area and Volume by double integral. Problems.</p>			
Module-2 Vector Calculus		(8 hours)	
<p>Introduction to Vector Calculus in Mechanical Engineering applications. Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence, solenoidal and irrotational vector fields. Problems. Vector Integration: Line integrals, Surface integrals. Statement of Green's theorem and Stoke's theorem. Problems. Applications: Heat and mass transfer, oil refinery problems, environmental engineering, velocity and acceleration of moving particles, analysis of streamlines.</p>			
Module-3 Partial Differential Equations (PDE's)		(8 hours)	
<p>Importance of partial differential equations for Mechanical Engineering application. Formation of PDE's by elimination of arbitrary constants and functions. Solution of nonhomogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of the one dimensional heat equation and wave equation. Applications: Vibration of a rod/membrane.</p>			
Module-4 Numerical Methods -1		(8 hours)	
<p>Importance of numerical methods for discrete data in the field of Mechanical Engineering. Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula (All formulae without proof). Problems. Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules (without proof). Problems. Applications: Finding approximate solutions to solve mechanical engineering problems involving numerical data.</p>			
Module-5 Numerical Methods -2		(8 hours)	
<p>Introduction to various numerical techniques for handling Mechanical Engineering applications. 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</p>			

corrector formula (No derivations of formulae). Problems.
Applications: Finding approximate solutions to solve mechanical engineering problems.

List of Laboratory experiments (2 hours/week) 10 lab sessions + 2 Lab Assessment

Suggested software's : MATLAB

1. Finding velocity and acceleration of vectors, gradient of a scalar function
2. Divergence and curl of a Vector field.
3. Integration, Double and Triple Integration
4. Change of order of integration and beta and gamma functions.
5. Introduction to Programming. (if statement, for loop and while loop).
6. Programme using function command.
7. Solving transcendental using Regula – Falsi and Newton Raphson method.
8. Numerical solution of first order ODE by Modified Euler's method.
9. Solution of ODE of first order and first degree by Runge-Kutta 4th order method
10. Solution of ODE of first order and first degree by Milne's predictor-corrector method

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

22MATM21.1	Apply the concept of change of order of integration and variables to evaluate multiple integral and their usage in computing area and volume.
22MATM21.2	Use the applications of vector calculus refer to solenoidal, irrotational vectors, orthogonal curvilinear coordinates.
22MATM21.3	Demonstrate partial differential equations and their solutions for physical interpretations.
22MATM21.4	Adapt the knowledge of beta and gamma functions to evaluate improper integrals.
22MATM21.5	Classify numerical methods to solve algebraic and transcendental equations.
22MATM21.6	Explain the knowledge of numerical methods in analyzing the discrete data and for solving the physical and engineering problems.

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours**)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Higher Engineering Mathematics	Dr B.S. Grewal	Khanna Publishers	44th Edition, 2021
2	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10 th Edition, 2018

Reference Books				
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3	A textbook of Engineering Mathematics	N.P Bali and Manish Goyal	Laxmi Publications	10 th Edition, 2022
4	Advanced Engineering Mathematics	C. Ray Wylie, Louis C. Barrett	McGraw – Hill Book Co., Newyork	6 th Edition, 2017
5	Engineering Mathematics for Semester I and II	Gupta C. B, Sing S. R and Mukesh Kumar	McGraw – Hill Book Co., New York	1 st Edition, 2015
6	Higher Engineering Mathematics	H.K. Dass and Er. Rajnish Verma	S Chand Publications	3 rd Edition, 2014.
7	Calculus	James Stewart	Cengage Publications	7 th Edition, 2019
8	Linear Algebra and its Applications	David C Lay	Pearson Publishers	4 th Edition, 2018
9	Linear Algebra with Applications	Gareth Williams	Jones Bartlett Publishers Inc.	6 th Edition, 2017

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/111105122>,
- <https://www.youtube.com/watch?v=aqu6v4vdfd4>
- <https://www.youtube.com/watch?v=KglTZSst2sU>
- <https://www.youtube.com/watch?v=EOq72OGH4xg>
- <https://www.youtube.com/watch?v=DOYVOWCptJE>
- <https://www.youtube.com/watch?v=LYsIBqjQTdl>
- <https://archive.nptel.ac.in/courses/111/107/111107105/>
- <https://www.youtube.com/watch?v=iviiGB5vxLA>
- <https://nptel.ac.in/courses/111107063>
- <https://www.youtube.com/watch?v=zr12pnzNoXI>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22MATM21.1	3				2							
22MATM21.2		2			2							
22MATM21.3	3				2							
22MATM21.4		2			2							
22MATM21.5	3				2							
22MATM21.6		2			2							

1: Low 2: Medium 3: High

Physics for Mechanical Engineering Stream			
Semester	I/II	CIE Marks	50
Course Code	22PHYM12/22	SEE Marks	50
Teaching hours/Week (L:T:P)	2:2:2	Exam hours	03
Total Hours/Semester	40 hours Theory + 10-12 Lab slots	Credits	04
COURSE OBJECTIVES:			
The objectives of this course is to			
<ol style="list-style-type: none"> 1. Demonstrate competency and understanding of the basic concepts in Physics. 2. Develop problem solving skills and implementation in technology. 3. Develop team spirit and experimentation skills in Physics. 			
Module 1 Oscillations and Waves (08 Hours)			
Free oscillations:			
Definition of simple harmonic motion (SHM), derivation of equation for SHM. Mechanical simple harmonic oscillators (mass suspended to spring oscillator). Equation of motion for free oscillations, natural frequency of oscillations.			
Damped and forced oscillations:			
Theory of damped oscillations: over damping, critical & under damping. Theory of forced oscillations and resonance. Numerical Problems.			
Shock waves:			
Mach number, distinctions between- acoustic, ultrasonic, subsonic and supersonic waves. Properties of shock waves. Construction and working of Reddy shock tube, Applications of shock waves. Numerical Problems			
Pre-requisites: Basics of Oscillations			
Self-learning: Engineering applications of forced and damped oscillations.			
Module 2 Laser and Optical Fibers (08 Hours)			
Lasers: Basic properties of a LASER beam, Interaction of radiation with matter, Einstein's A and B coefficients, laser action, Population inversion, Metastable state, Requisites of a laser system, CO ₂ laser. Applications: LIDAR, Road profiling, Barcode scanner, Laser printing. Numerical problems.			
Optical Fibers: Introduction, Propagation mechanism, TIR, angle of acceptance, Numerical aperture (derivation), Fractional index change, Modes of propagation, Number of modes and V parameter, Types of optical fibers. Attenuation and mention of expression for attenuation coefficient. Discussion of block diagram of point-to-point communication, Intensity based fiber optic displacement sensor, Merits and demerits, Numerical problems.			
Pre-requisite: Properties of light			
Self-learning: Semiconductor Diode Laser and other laser applications			
Module 3 Electrical Properties of Materials and Applications (08 Hours)			
Quantum free electron theory of metals: Review of Classical free electron theory-mention of failures. Assumptions of Quantum free electron theory. Mention of expression for density of states, Fermi-Dirac Statistics (qualitative), Fermi factor, Fermi level. Derivation of the expression for Fermi energy at 0 K, Success of Quantum free electron theory.			
Superconductors: Introduction to Superconductors, Temperature dependence of resistivity, Meissner effect, Critical field, Temperature dependence of Critical field, Types of Superconductors, BCS theory (Qualitative), Quantum tunneling. High temperature superconductivity. Josephson junction. Applications-Lossless power transmission, MAGLEV, SQUIDS, Numerical problems.			
Pre requisites: Classification of materials.			
Self-learning: Dielectrics and applications			
Module 4 Elastic Properties of Materials (08 Hous)			
Elasticity:			
Concept of elasticity, plasticity, stress-strain curve, Hooke's law, different elastic moduli,			

Poisson's ratio. Relations between Y , η and K . Limits of Poisson's ratio.

Bending of beams:

Beams, Types of beams and applications, Neutral surface and neutral plane, expression for bending moment. Bending moment of a beam with circular and rectangular cross sections (qualitative). Derivation of Young's Modulus of a single cantilever.

Torsion of cylinder:

Expression for couple per unit twist of a solid cylinder (derivation). Torsion pendulum—expression for period of oscillation. Numerical problems.

Pre-requisites: Elasticity, Stress & Strain

Self-learning: Factors affecting elasticity, Applications of elastic materials in Engineering

Module 5 Material Characterization and Instrumentation Techniques (08 Hours)

Introduction to nanomaterials: Nanomaterial and nanocomposites. Principle, construction and working of X-ray Diffractometer, crystallite size determination by Scherrer equation, Principle, construction, working and applications of Atomic Force Microscopy (AFM), X-ray photoelectron spectroscopy(XPS), Scanning electron microscopy (SEM) and Transmission electron microscopy (TEM) Numerical Problems.

Pre requisites: Principle and working of optical Microscope

Self-learning: Applications of nanomaterials

List of Experiments:

Exercise

1. Forced mechanical oscillations and resonance- Helmholtz resonator
2. Single Cantilever
3. I and n by Torsional Pendulum

Demonstration

4. Series & Parallel Resonance
5. Spring Constant
6. Verification of Stefan's law

Structured Inquiry

7. Wavelength of LASER using Grating
8. Newton's Rings
9. Dielectric constant

Open ended

10. PHET Interactive Simulations

Web links and Video Lectures (e-Resources):

Laser: <https://www.britannica.com/technology/laser>

Laser: <https://nptel.ac.in/courses/115/102/115102124/>

Numerical Aperture of fiber: <https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement>

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>

Fracture in materials: <https://www.youtube.com/watch?v=x47nky4MbK8>

Material characterization: https://onlinecourses.nptel.ac.in/noc20_mm14/preview

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

https://virtuallabs.merlot.org/vl_physics.html

<https://phet.colorado.edu>

<https://www.myphysicslab.com>

Virtual lab:<https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham>

Textbooks				
Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	A Text Book of Engineering Physics	M N Avadhanulu and P G Kshirsagar	S Chand & Company Ltd, New Delhi	10th Revised Ed 2019
2	A Detailed Text Book of Engineering Physics	S P Basavaraju	Subhas Stores, Bangalore,	CBCS EDITION 2018
3	Engineering Physics	Gaur and Gupta	Dhanpat Rai Publications	2017
Reference Books				
1	Shock waves made simple	Chintoo S Kumar, K Takayama and K P J Reddy	Willey India Pvt. Ltd., New Delhi	2014
2	Vibrations and Waves (MIT introductory Physics Series)	A P French	CBS	2003 Edition
3	Solid State Physics	S O Pillai	New Age International Publishers	8th Ed: 2018
4	Lasers and Non Linear Optics	B B Laud	New Age International Publishers	3rd Ed 2011
5	An Introduction to Lasers theory and applications	M.N. Avadhanulu and P.S.Hemne	S. Chand and company Ltd -New Delhi.	2nd Ed 2012
6	Fundamentals of Fibre Optics in Telecommunication & Sensor Systems	B.P. Pal	New Age International Publishers	1 st Edition 2005
7	LASERS Principles, Types and Applications	K.R. Nambiar	New Age International Publishers	1st Edition 2006
8	Engineering Physics	S P Basavaraj,	Subhas Stores, Bangalore	2005 Edition
9	Quantum Computation and Logic: How Quantum Computers Have Inspired Logical Investigations	Maria Luisa Dalla Chiara, Roberto Giuntini, Roberto Leporini, Giuseppe Sergioli	Springer	Volume 48, 2018
10	Statistical Physics: Berkely Physics Course	F Reif	McGraw Hill.	Volume 5 2007
11	Introduction to Superconductivity	Michael Tinkham	Dover Publications,INC	II Edition 2004

Course Outcomes

CO No.	Course Outcomes (COs)
22PHYM12.1	Illustrate various types of waves and oscillations and their implications.
22PHYM12.2	Interpret the principles of LASERS, Optical fibers and their applications.
22PHYM12.3	Elucidate the concepts of electrical conductivity and superconductivity.
22PHYM12.4	Articulate the various elastic properties of materials for engineering applications.
22PHYM12.5	Demonstrate different instrumentation techniques for material characterizations.
22PHYM12.6	Analyze experimental results in groups after precise and honest measurements

Mapping of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22PHYM12.1	3	2	-	-	-	-	-	-	-	-	-	1
22PHYM12.2	3	2	-	-	-	-	-	-	-	-	-	1
22PHYM12.3	3	2	-	-	-	-	-	-	-	-	-	1
22PHYM12.4	3	2	-	-	-	-	-	-	-	-	-	1
22PHYM12.5	3	2	-	-	-	-	-	-	-	-	-	1
22PHYM12.6	3	2	1	1	2	-	-	1	2	-	-	1

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Chemistry for Mechanical Engineering Stream			
Course Code	22CHEM12/22	CIE Marks	50
Teaching Hours/Week (L:T:P)	2:2:2	SEE Marks	50
Credits	04	Total Marks	100
Course Learning Objectives: <ul style="list-style-type: none"> ● To acquire knowledge on principles of chemistry for engineering applications. ● To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering. ● To provide students with a solid foundation in analytical reasoning required to solve societal problems. 			
MODULE 1: Electrochemistry: Electrode Systems and Corrosion (08 Hrs)			
Electrodes and Cells – Introduction- Classification of cells - primary, secondary and concentration cells; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode, numerical on concentration cells. Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion. Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroless plating: Introduction, Electroless plating of copper (PCB). Inorganic coatings – anodizing and phosphating.			
MODULE 2: Energy sources, Conversion and storage (08 Hrs)			
Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Octane number- Reformulation of petrol. Sustainable energy sources: Hydrogen as a fuel - advantages, production and storage. Biofuels- Production of Biodiesel. Solar cells - Construction and working of Si based PV cell, advantages. Electrochemical Energy Systems: Introduction to batteries, Classification of batteries primary and secondary batteries; Battery characteristics; construction, working and applications of Lithium ion batteries (Li-MnO ₂).			
MODULE 3: Polymers for Engineering Applications (08 Hrs)			
Polymers - Introduction, Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (T _g); Structure and property relationship in polymers; Plastics - Definition of resins and plastics; Synthesis, properties and applications of PMMA and UF resin; Elastomers - Synthesis, properties and application of butyl rubber and nitrile rubber; Polymer composites - Composites as structural material; Synthesis and applications of Kevlar and Carbon fibers; Conducting polymers - Introduction, synthesis and conducting mechanism of polyacetylene and applications. Biodegradable polymers - Introduction, Polyglycolic acid - synthesis, degradation and uses.			
MODULE 4: Materials for Engineering Applications (08 Hrs)			
Alloys: Introduction, classification, composition, properties and applications of stainless steel, solders, brass, alnico and shape memory alloys. Ceramics: Introduction, classification based on chemical composition, properties and applications of perovskites. Lubricants: Introduction, classification, properties and applications of lubricants. Nanomaterials - Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: top-down and bottom-up approaches; Synthesis by sol-gel and chemical vapor deposition methods. Nanoscale materials: Graphene and carbon nanotubes - properties and applications.			

MODULE 5: Water Treatment and Analytical Techniques (08 Hrs)

Water treatment - Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD.

Analytical Techniques - Principle, Instrumentation and applications of Colorimetry (Copper), Flame Photometry (Sodium), Conductometry (Acid Mixtures).

Role of chemistry in artificial intelligence and machine learning.

PRACTICAL MODULE

A – Compulsory Experiments:

1. Estimation of total hardness of water by EDTA method.
2. Determination of COD of an industrial wastewater.
3. Estimation of percentage of copper in brass (analysis of alloy).
4. Estimation of iron in TMT bar by diphenyl amine/external indicator method.
5. Potentiometric estimation of FAS using std. $K_2Cr_2O_7$ (Electrochemical sensor).
6. Determination of pKa of a weak acid using glass electrode (pH sensor).
7. Conductometric estimation of mixture of strong and weak acid (conductometric sensors).
8. Estimation of copper in electroplating effluent by colorimetry (optical sensor).
9. Estimation of sodium in effluent using flame photometry.

B – Demonstration (offline/virtual):

1. Determination of calorific value of a solid fuel using bomb calorimeter.
2. Determination of rate of corrosion of mild steel by weight loss method.
3. Determination of viscosity coefficient of lubricant (Ostwald's viscometer).

C – Open Ended Experiments:

1. Electroless plating of Nickel on Copper
2. Determination of glucose by electrochemical sensors.
3. Electroplating of desired metal on substrate

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

22CHEM12/22.1	Solve for the problems in chemistry that are pertinent in engineering applications.
22CHEM12/22.2	Interpret the fundamentals of energy conversion and storage systems.
22CHEM12/22.3	Illustrate the chemistry of macromolecules for futuristic engineering applications.
22CHEM12/22.4	Explain the chemical properties of materials for engineering applications.
22CHEM12/22.5	Provide analytical reasoning required to solve societal problems.
22CHEM12/22.6	Analyze properties and processes associated with chemical substances in multidisciplinary situations

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text books				
1	Chemistry for Engineering Students	B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar.	Subash Publications	6th Edition, 2018

2	Engineering Chemistry along with lab experiments	R.V.Gadag & A. Nityananda Shetty	I K International Publishing House Private Ltd. New Delhi.	1st edition, 2019
3	Engineering Chemistry	P. C. Jain & Monica Jain	Dhanpat Rai Publications, New Delhi.	17th Edition 2016
Reference Books				
1	Engineering Chemistry	O. G. Palanna,	Tata McGraw Hill Education Pvt. Ltd. New Delhi	2nd Edition 2017
2	Nanochemistry A Chemical Approach to Nanomaterials	G.A.Ozin & A.C. Arsenault	RSC publishing	2nd Edition 2008
3	Wiley Engineering Chemistry	Wiley India	Wiley India Pvt. Ltd. New Delhi	2nd Edition 2013
4	Polymer Science	V R Gowariker, N V Viswanathan, Jayadev, Sreedhar	New Age Int. Publishers	4th edition 2021
5	Corrosion Engineering	M. G. Fontana	Tata McGraw Hill Publishing	3rd edition 2017

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/downloads/122101001/>
- <https://nptel.ac.in/courses/104/103/104103019/>
- <https://ndl.iitkgp.ac.in/>
- <https://www.youtube.com/watch?v=faESCxAWR9k>
- <https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLYhmvFtznRhuz8L1bb3X-9IbHrDMjHWWWh>
- <https://www.youtube.com/watch?v=j5Hml6KN4TI>
- <https://www.youtube.com/watch?v=X9GHBdyYcyo>
- <https://www.youtube.com/watch?v=1xWBPZnEJk8>
- <https://www.youtube.com/watch?v=wRAo-M8xBHM>

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

- <https://www.vlab.co.in/broad-area-chemical-sciences>
- <https://demonstrations.wolfram.com/topics.php>
- <https://interestingengineering.com/science>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22CHEM12/22.1	3	3	-	3	-	-	3	-	-	-	-	-	-	-
22CHEM12/22.2	3	3	-	3	-	-	3	-	-	-	-	-	-	-
22CHEM12/22.3	3	3	-	3	-	-	3	-	-	-	-	-	-	-
22CHEM12/22.4	3	3	-	3	-	-	3	-	-	-	-	-	-	-
22CHEM12/22.5	3	3	-	3	-	-	3	-	-	-	-	-	-	-
22CHEM12/22.6	3	3	-	3	-	-	3	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Elements of Mechanical Engineering			
Course Code:	22EME13/23	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:2)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Acquire a basic understanding of the formation of steam and its industrial application. 2. Acquire a basic knowledge of renewable energy resources and basic concepts of Hydraulic turbines. 3. Acquire knowledge of various engineering materials, sheet metals and metal joining techniques. 4. Acquire essential experience with heat transfer devices. 5. Acquire knowledge on automobile technology in transport application and basics of Refrigeration and Air-Conditioning. 6. Acquire essential experience on basic Power transmission systems, including measurements and metrology. 7. Acquire knowledge of basic concepts on manufacturing principles and machine tools and advancement 			
Module-1 (08 Hours)			
<p>Energy Sources and Power Plants: Construction and working of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant, Wind power plant.</p> <p>Steam Formation and Application: Steam formation, types of steam, steam properties and application of steam (Simple numerical problems)</p> <p>Introduction to basics of Hydraulic turbines and pumps: Principle and Operation of Hydraulic turbine: Pelton Wheel. Introduction to working of centrifugal pump.</p>			
Module-2 (08 Hours)			
<p>Engineering Materials: Types, properties and applications of ferrous and non-ferrous metals, ceramics, composites, smart materials, shape memory alloys and applications of sheet metal.</p> <p>Metal Joining Processes: Soldering, Brazing and Welding: Definitions. Classification and methods of soldering, brazing, and welding. Brief description of arc welding, and Oxy-acetylene welding, types of flames and working principal of MIG & TIG welding.</p>			
Module-3 (08 Hours)			
<p>Fundamentals of IC Engines: Components and working principles of 4-Stroke engines (SI & CI Engine)</p> <p>Insight into future mobility technology: Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles, Advantages and disadvantages of EVs and Hybrid Vehicles.</p> <p>Refrigeration and Air-Conditioning: Principle of refrigeration, Refrigeration effect, Ton of Refrigeration, COP, Refrigerants and their desirable properties. Principles and Operation of Vapor Compression, Working Principles of Air Conditioning and Applications of Air Conditioners.</p>			
Module-4 (08 Hours)			
<p>Mechanical Power Transmission: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, Gear Trains and their application: simple and compound Gear Trains. (Simple numerical problems on Gear trains involving velocity ratios).</p> <p>Fundamentals of Measurements & Metrology: Definitions, Objectives of metrology, linear and angular measurements. System of Limits, Fits, Tolerance, accuracy, precession.</p>			

Module-5 (08 Hours)

Machine Tools and Operations: Working principle of lathe, lathe operations: turning, facing, knurling, working principle of drilling, drilling operations: drilling, boring, reaming, working principle of milling machine, milling operations: slot milling and plane milling.

Introduction to Modern Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D Printing. Automation in industry: Fixed & flexible automation and basic elements with block diagrams

Introduction to Mechatronics & Robotics: Concept of open-loop and closed-loop mechatronic systems, Robot configurations, applications, advantages and disadvantages.

List of Laboratory Exercises related to above modules:

1. Demonstration of solar system
2. Basic performance test on Pelton wheel.
3. Material hardness testing (Brinell).
4. Sheet metal cutting & Soldering - Cone, Cylindrical, Tray.
5. Welding joints – T joint, Lap Joint, Butt Joint.
6. Valve timing diagram of IC engine.
7. Performance test on vapor compression refrigeration or air conditioner.
8. Study of instruments for linear and angular measurements.
9. Demonstration of machine tool operations.

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

22EME13/23.1	Apply basic concepts to determine the quality and properties of steam and understand the working principle of hydraulic machines.
22EME13/23.2	Access the mechanical behavior and properties of engineering materials, sheet metals and various joining processes.
22EME13/23.3	Analyze the working of I.C engine, Hybrid Vehicles, Refrigeration and Air Conditioning.
22EME13/23.4	Apply the concept of power transmission and understand the fundamentals of measurements and metrology.
22EME13/23.5	Comprehend the working of a lathe, milling machines, CNC machines, mechatronics, robotics and understand the different operations that can be carried out on these machines.
22EME13/23.6	Interpret the basic concepts of automation in industry.

Text books:

Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Elements of Mechanical Engineering	K R Gopalakrishna	Subhas Publications	38th Edition, 2018
Text Book of Elements of Mechanical Engineering	S Trymbaka Murthy	MEDTECH (Scientific International Pvt Ltd)	5 th Edition, 2019

Elements of Mechanical Engineering	Hajra Choudhury	Media Promoters, New Delhi	Vol 1 & 2, 2001
Reference Books			
Elements of Mechanical Engineering	Dr. A. S. Ravindra	Thomson Press (India) Ltd	8 th Edition, 2011
Introduction to Robotics: Mechanics and Control	Craig J. J	Pearson Education International	3 rd Edition, 2005
Mechatronics-Principles Concepts and Applications	NitaigourPremchand Mahalik	Tata McGraw Hill	1 st Edition, 2003
Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing	Ian Gibson, David W. Rosen, Brent Stucker	Springer	2 nd Ed. (2015)
Modern Electric, Hybrid Electric and FuelCell Vehicles.	MehrdadEhsani, Yimin Gao, Sebastien E. Gay and Li Emadi,	CRC Press LLC	1 st Edition, 2005
Engineering Metrology	R. K. Jain	Khanna Publishers	2009
Elements of Workshop Technology	Hajra Choudhury	Media Promoters, New Delhi	15th edition 2013

Weblinks/Video Lectures/MOOCs

1. **MOOC:**<https://nptel.ac.in/courses/112/105/112105123/>
2. **MOOC:**<https://nptel.ac.in/courses/112/107/112107208/>
3. **MOOC:**<https://nptel.ac.in/courses/112/103/112103262/>
4. **NPTEL:**<https://www.youtube.com/watch?v=GQHCnW12U6I>

Course Articulation Matrix

Course Outcomes (CO)	Program Outcomes (PO)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22EME13.1	-	-	-	-	-	-	-	-	2	2	-	2	-	-
22EME13.2	-	-	-	-	-	-	-	-	-	1	-	1	-	-
22EME13.3	-	-	-	-	-	-	-	-	-	1	-	1	-	-
22EME13.4	-	-	-	-	-	-	-	-	2	2	-	2	-	-
22EME13.5	-	-	-	-	-	-	-	-	-	1	-	1	-	-
22EME13.6	-	-	-	-	-	-	-	-	-	1	-	1	-	-

1: Low 2: Medium 3: High

Computer Aided Engineering Drawing			
Course Code	22CED13/23	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:2)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
CLO1: To expose the students to standards and conventions followed in preparation of engineering drawings.			
CLO2: To make them understand the concepts of orthographic and isometric projections.			
CLO3: To develop the ability of conveying the engineering information through drawings.			
CLO4: To make them understand the relevance of engineering drawing to different engineering domains.			
CLO5: To develop the ability of producing engineering drawings using drawing instruments.			
CLO6: To enable them to use computer aided drafting tools for the generation of drawings.			
Module-1 (12 Hours)			
Introduction(for CIE only)			
Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Coordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.			
Orthographic Projections of Points, Lines and Planes:			
Introduction to Orthographic projections: Orthographic projections of points in 1 st and 3 rd quadrants. Orthographic projections of lines (Placed in First quadrant only). Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular lamina (Placed in First quadrant only using change of position method).			
Module-2 (12 Hours)			
Orthographic Projection of Solids:			
Orthographic projection of right regular solids (Solids Resting on HP only): Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes & Tetrahedron.			
Module-3 (10 Hours)			
Isometric Projections:			
Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids.			
Module-4 (08 Hours)			
Development of Lateral Surfaces of Solids:			
Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only. Development of lateral surfaces of their frustums and truncations.			
Module-5 (08 Hours)			
Multidisciplinary Applications & Practice (For CIE Only):			
Free hand Sketching; True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture 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 AutoCAD or suitable software,			
Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings, practice on layers concept.			
Graphs & Charts: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.			

Course Outcomes: At the end of the course the student will be able to:				
22CED13.1	Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.			
22CED13.2	Produce computer generated drawings using CAD software.			
22CED13.3	Use the knowledge of orthographic projections to represent engineering information/ concepts and present the same in the form of drawings.			
22CED13.4	Develop isometric drawings of simple objects.			
22CED13.5	Develop the lateral surfaces of different objects.			
22CED13.6	Use the knowledge of engineering drawing to represent interdisciplinary engineering components or systems through graphical representation.			
Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1.	Engineering drawing	N. D. Bhatt & V. M. Panchal	Charotar Publishing House Gujarat.	48 th edition, 2005
2.	Computer Aided Engineering Drawing	Prof. M. H. Annaiah	New Age International Publisher, New Delhi.	2009
Reference Books				
1.	Computer Aided Engineering Drawing	S. Trymbaka Murthy	I.K. International Publishing House Pvt. Ltd., New Delhi,	3 rd revised edition, 2006.
2.	Engineering Graphics	K R Gopalakrishna	Subash Publishers, Bangalore.	32 nd edition, 2005
3.	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., New Delhi.	Eastern Economy Edition, 2005
4.	A Primer on Computer Aided Engineering Drawing		Published by VTU, Belgaum.	2006
Web links/Video Lectures/MOOCs				
1. https://nptel.ac.in/courses/112103019/				

Course Articulation Matrix

Course Outcomes (CO)	Program Outcomes (PO)													
	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
22CED13.1	2	-	-	-	2	-	-	-	-	-	-	-	-	-
22CED13.2	-	2	-	-	2	-	-	-	-	-	-	-	-	-
22CED13.3	-	2	-	-	2	-	-	-	-	-	-	-	-	-
22CED13.4	-	2	-	-	2	-	-	-	-	-	-	-	-	-
22CED13.5	-	2	-	-	2	-	-	-	-	-	-	-	-	-
22CED13.6	-	-	2	-	2	-	-	-	-	-	-	2	-	-

1: Low 2: Medium 3: High

Engineering Science Course (ESC) : Introduction to Civil Engineering			
Course Code:	22ESC141/241	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 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 			
Module -1			
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: Wood, 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, estimation of plinth area, carpet area, floor area ratio, etc., 8 hrs			
Module-2			
Societal and Global Impact of Infrastructure			
Infrastructure: Introduction to sustainable development goals, Smart city concept, clean city concept, Safe city concept.			
Environment: Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control.			
Built-environment: Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings, concept of natural light and ventilation in buildings 8 hrs			
Module-3			
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 (numerical included) , free body diagram, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force systems. 8 Hrs			
Module-4			
Centroid: Importance of centroid and center of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples. 8 Hrs			
Module-5			
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. 8 Hrs			

Course Outcomes:	
At the end of the course, the student will be able to:	
22ESC141/241.1	Explain the various disciplines of Civil engineering
22ESC141/241.2	Describe the infrastructure required for sustainable development
22ESC141/241.3	Determine the resultant and equilibrium of force systems.
22ESC141/241.4	Locate the centroid of the plane and built-up sections
22ESC141/241.5	Compute the moment of inertia of the plane and built-up sections.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Basic Civil Engineering and Engineering Mechanics,	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan	Laxmi Publications	3 rd Edition, 2015
2	Elements of Civil Engineering and Engineering Mechanics	Kolhapure B K,	Eastern Book Promoters Belgaum (EBPB)	8 th Edition 2014
3	Elements of Civil Engineering and Engineering Mechanics	H.J.Sawant and S.P.Nitsure	Technical publications	2 nd Edition, 2012
4	Elements of Civil Engineering and Engineering Mechanics	M N Sheshaprakash and Ganesh Mogaveer B	PHI Learning Private Limited	3 rd Edition, 2014
Reference Books				
1	Engineering Mechanics	Bhavikatti S S,	New Age International	7 th Edition, 2019
2	Engineering Mechanics	Timoshenko S, Young D. H., Rao J. V.,	Pearson Press	5 th Edition, 2017
3	Engineering Mechanics: Principles of Statics and Dynamics	R. C. Hibbler	Pearson	14 th Edition, 2016
4	Mechanics for Engineers, Statics and Dynamics	F. P. Beer and E. R. Johnston	McGraw Hill	12 th Edition, 2019
5	Engineering Mechanics	Irving H. Shames	Prentice Hall	4 th Edition, 2005
6	Engineering Mechanics: Statics	J. L. Meriam. L. and G. Kraige.	Wiley India	9 th Edition, 2018

Web links

- <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
- <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2>
- <https://www.youtube.com/watch?v=3YBXteL-qY4>
- <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10>
- <https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7>
- https://www.youtube.com/watch?v=atoP5_DeTPE
- <https://www.youtube.com/watch?v=ksmsp9OzAsI>
- <https://www.youtube.com/watch?v=x1ef048b3CE>
- https://www.youtube.com/watch?v=l_Nck-X49qc
- https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force
- <https://www.youtube.com/watch?v=RIBeeW1DSZg>
- <https://www.youtube.com/watch?v=R8wKV0UQtlo>
- https://www.youtube.com/watch?v=0RZHHgL8m_A
- <https://www.youtube.com/watch?v=Bls5KnQOWkY>

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

- https://www.youtube.com/watch?v=Zrc_gB1YYS0
- <https://play.google.com/store/apps/details?id=vn.edu.best4u.com.bieudonoiluc>
- https://www.youtube.com/watch?v=Hn_iozUo9m4
- <https://play.google.com/store/apps/details?id=com.teobou>
- <https://www.youtube.com/watch?v=WOHRp3V-QA0>

Course Articulation Matrix

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
22ESC141/241.1	3					1						
22ESC141/241.2	2					1	1					
22ESC141/241.3	2	3										
22ESC141/241.4	2	3										
22ESC141/241.5	2	3										

1: Low 2: Medium 3: High

Engineering Science Course (ESC) : Introduction to Electrical Engineering			
Course Code	22ESC142/242	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To discuss the basic concepts of Electrical Energy, Power and Power factor. 2. To illustrate the behavior of circuit elements in single-phase circuits. 3. To comprehend the importance of three phase ac circuits and connections. 4. To explain the construction and operation of transformers, DC generators and motors and induction motors. 5. To Discuss concepts of circuit protecting devices and earthing. 6. To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures. 			
Module-1			
<p>Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.</p> <p>Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach).</p> <p>DC Circuits: Ohm's Law and its limitations. Power ,Energy and Power Factor, series, parallel, series-parallel circuits. Simple Numerical. 8 Hours</p>			
Module-2			
<p>A.C. Fundamentals:</p> <p>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 in R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical).</p> <p>Three Phase Circuits: Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities (excluding proof). 8 Hours</p>			
Module-3			
<p>DC Machines:</p> <p>DC Generator: Principle of operation, constructional details, types of generators, advantages and applications of DC Generators.</p> <p>DC Motor: Principle of operation. Torque equation, types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only). Applications of DC motors. 8 Hours</p>			
Module-4			
<p>Transformers: Necessity of transformer, principle of operation, Types and construction of single phase transformers, EMF equation, losses.</p> <p>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. 8 Hours</p>			
Module-5			
<p>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.</p> <p>Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.</p> <p>Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock. 8 Hours</p>			

Course Outcomes:	
At the end of the course the student will be able to:	
22ESC142.1	Describe the concepts of various energy sources.
22ESC142.2	Discuss the construction and operation of AC and DC Electrical Machines.
22ESC142.3	Explain the concepts of conventional and non-conventional energy resources and electric power generation.
22ESC142.4	Comprehend the procedure of calculating electricity billing.
22ESC142.5	Illustrate the use of circuit protective devices and earthing.
22ESC142.6	Describe the concepts of Electric circuit .

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Basic Electrical Engineering.	D C Kulshreshtha.	Tata McGraw Hill.	First Edition 2019.
2	A text book of Electrical Technology.	B.L. Theraja.	S Chand and Company	Reprint edition 2014.
Reference Books				
1	Basic Electrical Engineering,	D.P Kothari and I. J. Nagrath,	Tata Mc Graw Hill	4th edition, 2019.
2	Principles of Electrical Engineering & Electronics	V. K. Mehta, Rohit Mehta,	S Chand and Company	2nd edition, 2015.

Web links/Video Lectures/MOOCs/papers
1. http://vlabs.iitkgp.ernet.in/be/#
2. https://phet.colorado.edu/en/simulations/circuit-construction-kit-dc

Course Articulation Matrix

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22ESC142.1	3	2	1	0	1	1	1	1	0	0	0	1
22ESC142.2	3	3	2	1	1	1	0	0	0	0	0	1
22ESC142.3	3	2	1	1	1	1	1	1	0	0	0	1
22ESC142.4	3	2	2	1	0	1	1	1	0	0	0	1
22ESC142.5	3	1	2	0	1	2	1	1	0	0	1	1
22ESC142.6	3	2	1	0	1	1	1	1	0	0	0	1

1: Low 2: Medium 3: High

Engineering Science Course (ESC) : Introduction to Electronics Engineering			
Course Code	22ESC143/243	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Analyse the working of rectifiers, regulators and common emitter circuits. 2. Explain different types of oscillators and applications of Operational Amplifiers. 3. Describe the different numbering systems. 4. Analyse the application of gates in building fundamental blocks of digital circuits. 5. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application embedded systems. 6. Understand the various components of communication system and basic modulation techniques. 			
Module-1			
<p>p-n junction diode, Characteristics and Parameters, Diode Approximations, Half-Wave Rectification (HWR), Full-Wave Rectification (FWR), Filter Circuits, Voltage Regulators. BJT as Amplifier (qualitative analysis only) (Text 4: 1.4, 1.6 -1.7, 2.1-2.3, 3.1-3.3, 4.3).</p> <p>Activities: Virtual lab experiments on Rectifiers. 8 Hours</p>			
Module-2			
<p>Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Crystal controlled oscillators (Only concepts, working, and waveforms. No mathematical derivations) (Text 1-Chapter 9).</p> <p>Operational Amplifiers (Op-Amp) - Ideal Op-Amp, characteristics of ideal and practical Op-Amp, Practical Op-Amp circuits: Inverting and Non-inverting amplifiers, Voltage follower, Summer, Subtractor, Integrator, Differentiator (Text 1-Chapter 8).</p> <p>Activities: Multisim based experiments on Op-Amp as Inverting and Non-inverting amplifiers, Voltage follower, Summer, Subtractor, Integrator and Differentiator. 8 Hours</p>			
Module-3			
<p>Boolean Algebra and Logic Circuits: Binary numbers, Number Base Conversion, Octal & Hexadecimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2: 1.2, 1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7).</p> <p>Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder (Text 2: 4.1, 4.2, 4.3).</p> <p>Activities: Demonstrate the working of Basic gates and De Morgan’s law using trainer kits. 8 Hours</p>			
Module-4			
<p>Embedded Systems – Definition, Embedded Systems versus general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor versus Microcontroller, RISC versus CISC. (Text 5: Chapter1).</p> <p>Activities: LED, serial monitor, ultrasonic sensor using Arduino 8 Hours</p>			
Module-5			
<p>Communication Schemes – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM, FM, Concept of Radio wave propagation (Ground, space, sky) Mobile Communication (Text book 3)</p> <p>Activities: Demonstrate the working of AM and FM. 8 Hours</p>			

Course Outcomes: At the end of the course the student will be able to:	
22ESC143/243.1	Explain and analyse the working of diode as rectifier, regulator and also BJT as an Amplifier.
22ESC143/243.2	Describe the different types of oscillators and applications of Operational Amplifiers.
22ESC143/243.3	Illustrate the different number system conversions used in the digital devices.
22ESC143/243.4	Apply the knowledge of gates in designing different fundamental blocks of digital circuits.
22ESC143/243.5	Explain the basics of embedded systems.
22ESC143/243.6	Describe the different types of basic modulation techniques used in communication systems.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electronic Circuits, Fundamentals & Applications	Mike Tooley	Elsevier	4 th Edition, 2015.
2	Digital Logic and Computer Design	M. Morris Mano	PHI Learning	5 th Edition, 2008.
3	Basic Electronics	D P Kothari, I J Nagrath	McGraw Hill Education (India),	2 nd Edition, 2018.
4	Electronic Devices and Circuits	David A Bell	Oxford University Press	5 th Edition, 2008.
5	Introduction to Embedded Systems	Shibhu KV	McGraw Hill Education (India),	2 nd Edition 2017
Reference Books				
1	Electronic Devices	Thomas L. Floyd	Pearson Education	9 th Edition, 2012.
2	Electronic Devices and Circuit Theory	R Boylestad, Nashelskey	Pearson Education	11 th Edition, 2013.

Web links/Video Lectures/MOOCs/papers

1. Basic Electronics Virtual Lab-IIT Kharagpur: <http://vlabs.iitkgp.ac.in/be/>
2. Digital Electronics https://www.youtube.com/watch?v=2xXErGeeb_Q
3. <https://www.youtube.com/c/nesoacademy>

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ESC143/243.1	2				3				1					
22ESC143/243.2	1				3				1					
22ESC143/243.3	1	2												
22ESC143/243.4	1	2												
22ESC143/243.5	1													
22ESC143/243.6	1													

1: Low 2: Medium 3: High

Engineering Science Course (ESC): Introduction to Mechanical Engineering

Course Code:	22ESC144/244	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03

Course Learning Objectives:

1. Acquire a fundamental understanding role of Mechanical Engineering in NTM .
2. Acquire a basic knowledge of renewable energy resources.
3. Acquire knowledge of various engineering materials and metal joining techniques.
4. Acquire knowledge of IC engines, EVs & Hybrid vehicles.
5. Acquire essential experience on machine tools and power transmission system
6. Acquire knowledge of basic concepts on CNC, mechatronics and robotics.

Module-1 (8 Hours)

Energy Sources and Power Plants: Introduction and application of energy sources, Construction and working of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant, Wind power plant and concept of bio-fuels.

Non traditional Machining Processes : Ultrasonic Machining (USM), Electrochemical Machining (ECM), Electrical Discharge Machining (EDM), Electron Beam Machining (EBM) and Laser Beam Machining (LBM)

Module-2 (8 Hours)

Engineering Materials: Types, properties and applications of ferrous and non ferrous metals, ceramics, composites, smart materials and shape memory alloys.

Metal Joining Processes: Soldering, Brazing and Welding: Definitions, Classification and methods of soldering, brazing, and welding. Brief description of arc welding, Oxy-acetylene welding and types of flames.

Module-3 (8 Hours)

Fundamentals of IC Engines: Components and working principle of 4-stroke petrol and diesel engines, Application of IC Engines

Insight into future mobility technology: Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles, Advantages and disadvantages of EVs and Hybrid vehicles.

Module-4 (8 Hours)

Machine Tools and Operations: Working principle of lathe, lathe operations: turning, facing, knurling, working principle of drilling, drilling operations: drilling, boring, reaming, working principle of milling machine, milling operations: slot milling and plane milling.

Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, Gear Trains and their application: simple and compound Gear Trains.

Module-5 (8 Hours)

Introduction to Modern Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D Printing.

Automation in industry: Fixed & flexible automation and basic elements with block diagrams

Introduction to Mechatronics & Robotics: Concept of open-loop and closed-loop mechatronic systems, Robot configurations, applications, advantages and disadvantages.

Practical based learning:

Demonstration 1:

Lathe: Parts of a lathe, Principle of working of a centre lathe, Operations on the lathe -Turning, Facing, Knurling. Milling Machine: Working principle of milling and operations. Drilling

Machine: Principle of working and operations.
Demonstration 2:
1. Working Principle of 4 Stroke Petrol and Diesel Engine.
2. Working principle of welding.

Course Outcomes:	
At the end of the course the student will be able to:	
22ESC144.1	Apply basic concepts to role of mechanical engineering in NTM and energy sources.
22ESC144.2	Access the mechanical behavior and properties of engineering materials and various joining processes.
22ESC144.3	Analyze the working of I.C engine, Electric Vehicles and Hybrid Vehicles,
22ESC144.4	Apply the concept of machine tools and power transmissions.
22ESC144.5	Comprehend the working of CNC machines, mechatronics, robotics and understand the different operations that can be carried out on these machines.
22ESC144.6	Interpret the basic concepts of automation in industry.

Weblinks/Video Lectures/MOOCs	
1. MOOC: https://nptel.ac.in/courses/112/105/112105123/	
2. MOOC: https://nptel.ac.in/courses/112/107/112107208/	
3. MOOC: https://nptel.ac.in/courses/112/103/112103262/	
4. NPTEL: https://www.youtubecom/watch?v=GQHCnWl2U6I	

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition And Year
Textbooks				
1	Elements of Mechanical Engineering	K R Gopalakrishna	Subhas Publications	38th Edition, 2018
2	Text Book of Elements of Mechanical Engineering	S Trymbaka Murthy	MEDTECH (Scientific International Pvt Ltd)	5 th Edition, 2019
3	Elements of Mechanical Engineering	Hajra Choudhury	Media Promoters, New Delhi	Vol 1 & 2, 2001
Reference Books				
1	Elements of Mechanical Engineering	Dr. A. S. Ravindra	Thomson Press (India) Ltd	8 th Edition, 2011
2	Introduction to Robotics: Mechanics and Control	Craig J. J	Pearson Education International	3 rd Edition, 2005
3	Mechatronics-Principles Concepts and Applications	NitaigourPremchand Mahalik	Tata McGraw Hill	1 st Edition, 2003
4	Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing	Ian Gibson, David W. Rosen, Brent Stucker	Springer	2 nd Ed. (2015)

5	Modern Electric, Hybrid Electric and FuelCell Vehicles.	MehrdadEhsani, Yimin Gao, Sebastien E. Gay and Li Emadi,	CRC Press LLC	1 st Edition, 2005
6	Modern Maching Process	P. C. Pandey and H. S. Shah	McGraw Hill Education India Pvt. Ltd.	2000

Course Articulation Matrix

Course Outcomes (CO)	Program Outcomes (PO)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ESC144.1	-	-	-	-	-	-	-	-	2	2	-	2	-	-
22ESC144.2	-	-	-	-	-	-	-	-	-	1	-	1	-	-
22ESC144.3	-	-	-	-	-	-	-	-	-	1	-	1	-	-
22ESC144.4	-	-	-	-	-	-	-	-	2	2	-	2	-	-
22ESC144.5	-	-	-	-	-	-	-	-	-	1	-	1	-	-
22ESC144.6	-	-	-	-	-	-	-	-	-	1	-	1	-	-

1: Low 2: Medium 3: High

Engineering Science Course (ESC): Introduction to C Programming			
Course Code	22ESC145/245	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:2)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Understand the basic concepts of Computer System and Computer Programming 2. Explain the basic concepts of C Programming Language Constructs. 3. Design and Develop Programming Skills. 4. Explore user-defined data structures like arrays and structures in implementing solutions to problems 5. Apply programming constructs of C language to solve the real-world problems 			
Module-1			
Introduction to C Programming Language, Operators and Expressions			
Introduction to Computers, input and output devices.			
Introduction to C Language: Basic structure of a C program, Character sets, C Tokens, Keywords, Identifiers, Constants, Variables, Declaration and Initialization of Variables, Data types.			
Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional Operators, Arithmetic Expressions and Evaluation, Precedence and Associativity, Type conversions			
Textbook 1: Chapter Chapter 1(Pg No:12), 2(Pg No:22-41), 3(Pg No:52-69)			
Textbook 2: Chapter 1(1.1-1.2), Chapter 2(2.1-2.4) 8 Hours			
Module-2			
Managing input/output Operation and Decision Making and Branching			
Reading and writing a character, Formatted Input and Output			
Decision making: Decision making statements: if, if-else, nested if-else, cascaded if-else, switch statement.			
Textbook 1: Chapter (Pg No:82-101), 5(Pg No:112-133) 8 Hours			
Module-3			
Decision making and Looping, Arrays			
Looping statements: for, while, do-while, Branching statements: break and continue			
Arrays: Introduction, One - Dimensional, Two- Dimensional arrays : declaration, initialization.			
Textbook 1: Chapter 6(Pg No: 151-173), 7(Pg No: 189-211) 8 Hours			
Module-4			
Strings, Structures			
Strings: Introduction to Strings, Declaration and initialization, Reading strings from the terminal, Writing strings to screen, String handling functions.			
Structures: Introduction, Defining a structure, Declaring Structure variables, Accessing Structure Members, Initialization, Operations on individual members, Array of structures, Arrays within structures, Structures within structures.			
Textbook 1: Chapter 8(Pg No: 235-254), 10(Pg No: 320-334) 8 Hours			
Module-5			
User defined functions			
User defined Functions: Definition, elements of user defined functions. Category of user defined functions, Passing arrays to functions, Passing string to functions.			
Textbook 1: Chapter 9(Pg No: 267-297) 8 Hours			

List of Laboratory Experiments related to above modules – 2 hours each

1. C Program to find Mechanical Energy of a particle using $E = mgh + \frac{1}{2} mv^2$.
2. Write a C program to simulate a simple calculator that performs arithmetic operations like addition, subtraction, multiplication, and division only on integers. Error messages should be reported, if any attempt is made to divide by zero
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 amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
4. C Program to Sort the given set of N numbers using Bubble Sort.
5. C Program to implement Binary Search.
6. Write a C Program to Implement structures to read, write, and compute the average- marks and the students scoring above and below the average marks for a class of N students.
7. C Program to implement string operations string length and string compare using user defined functions.

Open ended experiment covering the concept of entire syllabus**Course Outcomes:**At the end of the course the student will be able to:

22ESC145/245.1	Describe the basics of Computer systems and C programming language and Evaluate expressions using C operators.
22ESC145/245.2	Apply the concepts of Input/output and decision making in C.
22ESC145/245.3	Develop C programs using different looping constructs.
22ESC145/245.4	Develop C programs using arrays.
22ESC145/245.5	Implement C programs using Structures and strings.
22ESC145/245.6	Implement modular programs using different programming constructs in C .

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Programming in ANSI C	E. Balaguruswamy	Tata McGraw-Hill, India,	7 th Edition, 2017.
2	Computer Fundamentals and Programming in C	Reema Thareja	Oxford University	2 nd Edition, 2017
Reference Books				
1	Computer Science, A Structured programming approach using C.	Behrouz A. Forouzan	Cengage Learning	3 rd Edition, 2007
2	“Programming with C”, Schaum’s Outlines.	Byron Gottfried Schaum’s	Tata McGraw-Hill	3 rd Edition, 2017

Web links/Video Lectures/MOOCs/papers1.<https://arjunkcse.blogspot.com/p/blogpage.htm>.2.<https://nptel.ac.in/courses/106/105/106105171/#>.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ESC145/245.1	-	-	-	-	-	-	-	-	2	1	-	-	-	-
22ESC145/245.2	-	-	1	-	-	-	-	-	2	-	-	-	-	-
22ESC145/245.3	-	-	1	-	-	-	-	-	2	-	-	-	-	-
22ESC145/245.4	-	-	1	-	-	-	-	-	-	1	-	-	-	-
22ESC145/245.5	-	-	1	-	-	-	-	-	2	-	-	-	-	-
22ESC145/245.6	-	-	1	-	-	-	-	-	2	-	-	-	-	-

1: Low 2: Medium 3: High

Emerging Technology Course : INTRODUCTION TO NANOTECHNOLOGY			
Course Code	22ETC15A/25A	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
The learning objectives of this course are:			
<ol style="list-style-type: none"> 1. To provide a comprehensive overview of synthesis and characterization of nanoparticles, nanocomposites and hierarchical materials with nanoscale features. 2. To provide the engineering students with necessary background for understanding various nanomaterials characterization techniques. 3. To develop an understanding of the basis of the choice of material for device applications. 4. To give an insight into complete systems where nanotechnology can be used to improve our everyday life. 			
Module-1			
Introduction to Nanomaterials			
Nanotechnology - Frontier of future - An Overview, Length Scales, Variation of physical properties from bulk to thin films to nanomaterials, Confinement of electron in 0D, 1D, 2D and 3D systems, Surface to Volume Ratio, Synthesis of Nanomaterials: Bottom-Up approach: Chemical Routes for Synthesis of nanomaterials, Sol-gel, Precipitation, Solution Combustion synthesis, Hydrothermal, SILAR, Chemical Bath Deposition. Top-Down approach: Ball milling technique, Sputtering, Laser Ablation. 08 hours			
Module-2			
Characterization of Nanomaterials			
Basic principles and instrumentations of Electron Microscopy – Transmission Electron Microscope, Scanning Electron Microscope, Scanning Probes - Scanning Tunneling microscope, Atomic Force Microscope. Different imaging modes, comparison of SEM and TEM, AFM and STM, AFM and SEM. Basic principles of working of X-ray diffraction, Debye-Scherrer equation and its application in simple numerical, Optical Spectroscopy- Instrumentation and application of IR, UV/VIS (Band gap measurement). 08 hours			
Module-3			
Carbon Based Materials			
Introduction, Synthesis, Properties (Electrical, Electronic, and Mechanical), and Applications of Graphene, SWCNT, MWCNT, Fullerenes and other Carbon Materials: Carbon nanocomposites, nanofibres, nanodiscs, nanodiamonds. 08 hours			
Module-4			
Nanotechnology in Energy Storage and Conversion			
Solar Cells: First generation, Second generation and Third generation solar cells. Construction and working of Dye sensitized and Quantum dot sensitized solar cells.			
Batteries: Nanotechnology in Lithium ion battery- working, Requirements of anodic and cathodic materials, classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials, Anodic materials, Separators.			
Fuel Cells: Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and proton exchange membranes. 08 hours			
Module-5			
Applications of Nanotechnology			
Nanotechnology Applications and Recent Breakthroughs: Introduction, Significant Impact of Nanotechnology and Nanomaterials in - Medicine and Healthcare Applications, Biological and Biochemical Applications (Nano biotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), Chemical Applications (Nano chemistry), Optical Applications (Nano photonics), and Agriculture and Food Applications. 08 hours			

Course Outcomes: At the end of the course the student will be able to:	
22ETC15A.1	Compare the various synthesis techniques of nanoparticles on their relative merits and demerits. [L4]
22ETC15A.2	Discuss the working of basic instruments used in characterization of nanoparticles and interpret the results [L3]
22ETC15A.3	Discuss the applications of nanotechnology in the domain of energy storage and conversion [L2]
22ETC15A.4	Classify the nanomaterials based on their dimensions. [L3]
22ETC15A.5	Assess the suitability of nanomaterials for various devices and applications. [L4]
22ETC15A.6	Discuss the applications of carbon based nanomaterials [L3]

Sl. No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	NANO: The Essentials: Understanding Nanoscience and Nanotechnology	T Pradeep	McGraw Hill Education	1st Edition, 2017
2.	Nanotechnology - The Science of Small.	M A Shah, K A Shah	Wiley	2nd Edition, 2019
3.	Textbook On Fundamentals & Applications Of Nanotechnology	K S Subramanian, K Raja, M Kannan	Daya Publishing House	1st Edition, 2018
4	Textbook of Nanoscience and Nanotechnology	B.S. Murty, P. Shankar, Baldev Raj, B B Rath	Springer Universities Press	August 2016
Reference Books				
1	Introduction to Nanoscience and Nanotechnology, An Indian Adaptation.	Charles P Poole, Jr Frank J Owens	Wiley	1 Dec 2020
2	Understanding Nanotechnology	Scientific American	Grand Central Publishing	Dec 2002`
3	Nanotechnology: Basic Science and Emerging Technologies	Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse	Chapman & Hall	June 2002
4	Nano Materials	A. K. Bandyopadhyay	New Age Science	Oct 2009
Web links/Video Lectures/MOOCs				
1. https://nptel.ac.in/courses/118104008				
2. https://www.digimat.in/nptel/courses/video/118104008/L16.html				
3. https://archive.nptel.ac.in/courses/113/106/113106099/				
4. https://nptel.ac.in/courses/112107283				
5. https://onlinecourses.nptel.ac.in/noc22_me131/preview				
6. https://www.coursera.org/learn/nanotechnology				

Course Articulation Matrix

Course Outcomes (CO)	Program Outcomes (PO)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ETC15A.1	-	-	-	2	-	-	-	-	-	-	-	-	-	-
22ETC15A.2	-	-	-	-	3	-	-	-	-	-	-	-	-	-
22ETC15A.3	-	-	-	-	-	-	3	-	-	-	-	-	-	-
22ETC15A.4	-	-	-	2	-	-	-	-	-	-	-	-	-	-
22ETC15A.5	-	-	3	-	-	-	-	-	-	-	-	-	-	-
22ETC15A.6	-	-	-	2	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Emerging Technology Course: RENEWABLE ENERGY SOURCES			
Course Code	22ETC15B/25B	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
The learning objectives of this course are:			
<ol style="list-style-type: none"> 1. To develop an understanding of the energy scenario, energy sources and their utilization. 2. To explore society's present needs and future energy demands. 3. To provide a comprehensive overview of the principles of renewable energy conversion systems. 4. To provide the engineering students with necessary background for understanding various energy conservation methods. 			
Module-1			
Introduction:			
Principles of renewable energy; energy and sustainable development, fundamentals and social implications. Global Energy Scenario: Energy demand, Energy consumption in various sectors, worldwide renewable energy availability, renewable energy availability in India, role of energy in economic development and social transformation, Introduction to Internet of energy (IOE). 08 hours			
Module-2			
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. 08 hours			
Module-3			
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 multi blade system. Vertical axis- Savonius and darrieus types. Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-fixed dome and floating dome; Urban waste to energy conversion. 08 hours			
Module-4			
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. 08 hours			
Module-5			
Green Energy: Introduction, Fuel cells: Classification of fuel cells – H ₂ ; Operating principles. Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy. 08 hours			
Course Outcomes:			
At the end of the course the student will be able to:			
22ETC15B.1	Summarise the environmental aspects of renewable energy resources.		
22ETC15B.2	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation.		

22ETC15B.3	Explain the conversion principles of wind and tidal energy
22ETC15B.4	Illustrate the concept of biomass energy resources and green energy.
22ETC15B.5	Acquire the basic knowledge of ocean thermal energy conversion and hydrogen energy.
22ETC15B.6	Compare the green energy with the conventional energy sources.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Non-conventional Energy sources	G D Rai	Khanna Publication	Fourth Edition, 2006
2.	Energy Technology	S.Rao and Dr. B.B. Parulekar	Khanna Publication	Third edition, 2002.
Reference Books				
1	Solar energy	Subhas P Sukhatme	Tata McGraw Hill	2nd Edition, 1996
2	Non-Conventional Energy Resources	Shobh Nath Singh,	Pearson	Third edition, 2015
Web links/Video Lectures/MOOCs				
1. E-book URL: https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html (accessed on 23 Nov 2022)				
2. E-book URL: https://www.pdfdrive.com/renewable-energy-sources-and-their-applications-e33423592.html (accessed on 23 Nov 2022)				

Course Articulation Matrix

Course Outcomes (CO)	Program Outcomes (PO)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ETC15B.1	-	-	-	-	-	-	3	-	-	-	-	2	-	-
22ETC15B.2	-	-	-	-	-	-	2	-	-	-	-	2	-	-
22ETC15B.3	2	-	-	-	-	-	-	-	-	-	-	2	-	-
22ETC15B.4	-	-	-	-	-	-	3	-	-	-	-	3	-	-
22ETC15B.5	2	-	-	-	-	-	-	-	-	-	-	-	-	-
22ETC15B.6	-	-	-	-	-	-	3	-	-	-	-	2	-	-

1: Low 2: Medium 3: High

EMERGING APPLICATIONS OF BIOSENSORS			
Semester	I/II	CIE Marks	50
Course Code	22ETC15C/25C	SEE Marks	50
Teaching hours/Week (L:T:P)	3:0:0	Exam hours	03
Total Hours/Semester	40 Hours of Theory	Credits	03
Course objectives			
<ol style="list-style-type: none"> To learn the Fundamentals of biosensors. To acquaint the student with design and construction of biosensors. To expose the students to recent advances in application of biosensors in health, environment, agriculture and food industry. 			
Module 1: INTRODUCTION TO BIOSENSORS (8 Hours)			
<p>Introduction to biosensor, General components of biosensor, Biomolecules in biosensors such as enzyme, DNA, antigen antibody, protein, Classification of biosensors based on principle: amperometric, potentiometric biosensors, optical, acoustic, piezoelectric, and calorimetric biosensors, scope of biosensors and its limitations.</p> <p>Pre-requisite: Biomolecules Self-learning: Scope of biosensors</p>			
Module 2: BASIC DESIGN AND TRANSDUCER (8 Hours)			
<p>Design Considerations: calibration, dynamic Range, signal to noise, sensitivity, selectivity, Interference recognition. Transduction membrane protein sensors: ion channels, Types of Transducer, Optical; Fiber Optic, ECL, Surface Plasmon Resonance, Electro chemical; FET, Impedance, Piezoelectric; Cantilever,</p> <p>Pre-requisite: Piezoelectric effect Self-learning: Ion channel biosensors</p>			
Module 3: APPLICATIONS OF BIOSENSORS IN HEALTH AND ENVIRONMENT (8 Hours)			
<p>Biosensors and diabetes management, Microfabricated biosensors and point-of-care diagnostics systems, Noninvasive biosensors in clinical analysis; Surface plasmon resonance and evanescent wave biosensors, Biosensor in cancer and HIV early diagnosis.</p> <p>Pre requisites: Diabetes Self-learning: Microfabrication</p>			
Module 4: APPLICATIONS OF BIOSENSORS IN FOOD AND AGRICULTURE INDUSTRY (8 Hours)			
<p>Detection of product content, allergic components, pathogens, pesticide residues. Monitoring of raw material conversions. Detection of crop diseases, pathogens in plants, Detection of soil nutrients, pesticide and its residual detection</p> <p>Pre-requisite: Pesticides Self-learning: Crop Diseases</p>			
Module 5: APPLICATIONS OF NANOMATERIALS IN BIOSENSORS (8 Hours)			
<p>Nano Materials in biosensors; Carbon based Nano Material, Metal oxide and nano particle, Quantum dots, Role of nano material in Signal Amplifications, Detection and Transducer Fabrication</p> <p>Pre-requisites: Nano materials Self-learning: Applications of Nanomaterials</p>			
<p>Web links and Video Lectures (e-Resources):</p> <ul style="list-style-type: none"> • https://www.youtube.com/watch?v=kQ6CY1qpGjY • https://nptel.ac.in/courses/102101054 • https://onlinecourses.nptel.ac.in/noc20_ph13/preview • https://onlinecourses.nptel.ac.in/noc22_ph01/preview <p>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</p>			

- AV presentation by students (on specific topics).
- Discussion of case studies based on research findings.
- Model making and Poster presentations

Text Books

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Introduction to Biosensors	Jeong-Yeol Yoon	Springer-Verlag New York	2016 edition
2	Recognition Receptors in Biosensors	Mohammed Zourob	Springer-Verlag New York	2010 edition

Reference Books

1	Novel Approaches in Biosensors and Rapid Diagnostic Assays	Zvi Liron	Springer US	2001 edition
2	Biosensor Principles and Applications	Pierre R. C, and Loïc J.B	CRC Press	2019 edition

CO No.	Course Outcomes (COs)
22ETC15C.1	Classify types of biosensors based on principle.
22ETC15C.2	Articulate the types of transducers.
22ETC15C.3	Elucidate the different types of biomolecules used in biosensors.
22ETC15C.4	Apply bio sensing techniques in health, environment.
22ETC15C.5	Interpret the use of biosensors in agriculture and food industry.
22ETC15C.6	Analyze the use of nanomaterials to enhance the working of biosensors.

Course Articulation Matrix

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22ETC15C.1	3	2	-	-	2	-	2	-	-	-	-	
22ETC15C.2	3	2	-	-	2	-	2	-	-	-	-	
22ETC15C.3	3	2	-	-	2	-	2	-	-	-	-	
22ETC15C.4	3	2	-	-	2	-	3	-	-	-	-	
22ETC15C.5	3	2	-	-	2	-	2	-	-	-	-	
22ETC15C.6	3	2			2		2					

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Emerging Technology Course: Introduction to Internet of Things (IoT)			
Course Code	22ETC15D/25D	CIE Marks	50
Teaching Hours/Week (L: T: P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Understand the fundamentals of IoT 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. 4. Apply the knowledge to solve real time problems. 5. Make use of the IoT concepts for innovative ideas. 			
Module-1 (8 hours)			
IoT Physical Devices and Endpoints:			
Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.			
Module-2 (8 hours)			
IoT Sensing and Actuation:			
Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.			
Module-3 - (8 hours)			
IoT Devices and Networking Protocols:			
IoT devices, Networking basics, IoT networking connectivity protocols, IoT networking data messaging protocols, analyzing data to infer protocol and device characteristics.			
Module-4 - (8 hours)			
Associated IoT Technologies:			
IoT Physical Servers and Cloud Offerings: Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API.			
Industrial Internet of Things: Introduction, Industry 4.0, Industrial Internet of Things (IIoT),IIoT Architecture, Basic Technologies, Applications and Challenges.			
Module-5 - (8 hours)			
IoT applications and future trends:			
Vehicular IoT – Introduction, Healthcare IoT – Introduction, Agricultural IoT Introduction.			

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Introduction to IoT	Sudip Misra, Anandarup Mukherjee & Arijit Roy	Cambridge University Press	1 st edition, 2021
2	Introduction to Industrial Internet of Things and Industry 4.0	Sudip Misra, Anandarup Mukherjee & Arijit Roy	CRC Press	1 st Edition, 2020

3	Internet of Things - A Hands-on Approach	Arshdeep Bahga and Vijay Madiseti	Universities Press	1 st Edition, 2015
Reference Books				
1	Getting Started with Raspberry Pi	Matt Richardson & Shawn Wallace	O'Reilly (SPD)	1 st Edition, 2014
2	Rethinking the Internet of Things: A Scalable Approach to Connecting Everything	Francis D'Costa	Apress Publications	1 st Edition, 2013

Web links/Video Lectures/MOOCs/papers

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

Course Outcomes:

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

22ETC15D.1	Describe the evolution of IoT, IoT networking components and addressing strategies in IoT.
22ETC15D.2	Explain the basics of network layers.
22ETC15D.3	Classify various sensing devices and actuator types.
22ETC15D.4	Realize IoT using physical devices.
22ETC15D.5	Explain associated IoT technologies.
22ETC15D.6	Illustrate the architecture of IoT applications.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ETC15D.1	2	3	2			3								
22ETC15D.2	2													
22ETC15D.3	2		3	2										
22ETC15D.4			3	2										
22ETC15D.5			2		2									
22ETC15D.6			1				2		1					

1: Low 2: Medium 3: High

Emerging Technology Course: WASTE MANAGEMENT			
Course Code	22ETC15E/25E	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To learn broader understandings on various aspects of solid waste management practiced in industries. 2. To learn hazardous waste management and treatment, and integrated waste management. 3. To gain knowledge about solid waste characteristics and waste generation aspects. 4. To understand the methodology used in collection, storage, transport, and disposal of waste. 5. To apply the concept of waste processing techniques in recovery of products from solid waste to compost and biogas, incineration, and energy recovery. 			
Module-1			
INTRODUCTION TO SOLID WASTE MANAGEMENT: Classification of solid wastes (source and type based), solid waste management (SWM), elements of SWM, ESSWM (environmentally sound solid waste management) and EST (environmentally sound technologies), factors affecting SWM, Indian scenario, progress in MSW (municipal solid waste) management in India. 8 Hours			
Module-2			
WASTE GENERATION ASPECTS: Waste stream assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions. 8 Hours			
Module-3			
COLLECTION, STORAGE, TRANSPORT AND DISPOSAL OF WASTES: Waste Collection, Storage and Transport: Collection components, storage- containers/collection vehicles, collection operation, transfer station, waste collection system design, record keeping, control, inventory and monitoring, implementing collection and transfer system, a case study. Waste Disposal: key issues in waste disposal, disposal options and selection criteria, sanitary landfill, landfill gas emission, leachate formation, environmental effects of landfill, landfill operation issues, a case study. 8 Hours			
Module-4			
WASTE PROCESSING TECHNIQUES & SOURCE REDUCTION, PRODUCT RECOVERY & RECYCLING: Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering. Source Reduction, Product Recovery and Recycling: basics, purpose, implementation monitoring and evaluation of source reduction, significance of recycling, planning of a recycling programme, recycling programme elements, commonly recycled materials and processes, a case study. 8 Hours			
Module-5			
HAZARDOUS WASTE MANAGEMENT AND TREATMENT: Identification and classification of hazardous waste, hazardous waste treatment, pollution prevention and waste minimization, hazardous wastes management in India. 8 Hours			

Course Outcomes:	
At the end of the course the student will be able to:	
22ETC15E.1	Apply the basics of solid waste management towards sustainable development
22ETC15E.2	Gain knowledge on waste generation aspects.
22ETC15E.3	Apply technologies to process waste and dispose the same.
22ETC15E.4	Design working models to convert waste to energy
22ETC15E.5	Identify and classify hazardous waste and manage the hazard

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Solid Waste Management - Processing and Disposal	Dhundiraj Deshpande	AGPH Books	First Edition 2022
2	Solid Waste Management in Developing Countries	A D Bhide and B B Sundaresan	INSDOC	2010
3	Integrated Solid Waste Management	Tchobaanoglous, G., Theisen, H., and Samuel A Vigil	McGraw-Hill Publishers	1993
4	Waste Management	Bilitewski B., Hard He G., Marek K., Weissbach A., and Boeddicker H.	Springer	1994
Reference Books				
1.	Integrated solid waste management: a life cycle inventory.	White, F. R., Franke P. R., & Hindle M	Mc Dougall,P. John Wiley & Sons.	2001
2.	Handbook of solid waste management and waste minimization technologies	Nicholas, P., & Cheremisinoff, P. D	Imprint of Elsevier Science.	2005

Course Outcomes (COs)	PO1	PO 2	PO 3	PO 4	PO 5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
	22ETC15E.1	2					1					
22ETC15E.2	2					1						2
22ETC15E.3	2					1						2
22ETC15E.4	2					1						2
22ETC15E.5	2					1						2

1: Low 2: Medium 3: High

Emerging Technology Course: INTRODUCTION TO CYBER SECURITY			
Course Code	22ETC15F/25F	CIE Marks	50
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To familiarize cybercrime terminologies and perspectives 2. To understand Cyber Offenses and Botnets 3. To gain knowledge on tools and methods used in cybercrimes 4. To understand phishing and intrusion systems. 5. To understand the Cyber forensics and network forensics. 			
Module-1			
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)			8 Hours
Module-2			
Cyber Offenses: How Criminals Plan Them: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercafe & cybercrimes.			
Botnets: The fuel for cybercrime, Attack Vector.			
Textbook:1 Chapter 2 (2.1 to 2.7)			8 Hours
Module-3			
Tools and Methods used in Cybercrime: Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyware, Virus and Worms, Trojan Horses and Backdoors, DoS and DDOS Attacks, Attacks on Wireless networks.			
Textbook:1 Chapter 4 (4.1 to 4.9, 4.12)			8 Hours
Module-4			
Phishing and Identity Theft: Introduction, methods of phishing, phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft .			
Intrusion Detection Systems: Types of Intrusion - Attack Patterns - Host/Network-Based Intrusion Detection - Placement of the IDS - Honeypots .			
Textbook:1 Chapter 5 (5.1. to 5.3)			8 Hours
Module-5			
Computer Forensics: Introduction, Historical Background of Cyber Forensics, Digital Forensics Science, Need for Computer Forensics, 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)			8 Hours

Course Outcomes:	
At the end of the course the student will be able to:	
22ETC15F.1	Explain the cybercrime terminologies and the various cyber laws.
22ETC15F.2	Describe Cyber offenses and Botnets
22ETC15F.3	Illustrate Tools and Methods used on Cybercrime
22ETC15F.4	Explain phishing and identity thefts
22ETC15F.5	Illustrate the various intrusion detection systems
22ETC15F.6	Justify the need of cyber forensics and network forensics.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Cyber Security: Understanding Cyber Crimes, Forensics and Legal Perspectives	Sunit Belapure and Nina Godbole	Wiley India Pvt Ltd	First Edition (Reprinted 2018)
Reference Books				
1	Introduction to Security and Network Forensics	Buchanan, William J	CRC Press	2011
2	Principles of Information Security Michael E. Whitman, Herbert J. Mattord	Michael E. Whitman, Herbert J. Mattord,	Cengage Learning Pub	2nd Edition 2012

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ETC15F.1			1			1								
22ETC15F.2			2			2								
22ETC15F.3			1			1								
22ETC15F.4			1			1								
22ETC15F.5			1			1								
22ETC15F.6			1			1								

1: Low 2: Medium 3: High

Programming Language Course: Introduction to Web Programming			
Course Code	22PLC15A/25A	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:2)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. To use the syntax and semantics of HTML, XHTML and HTML5 2. To understand how CSS can enhance the design of a webpage 3. To develop different parts of a web page 4. To get familiarity with the client-side scripting using JavaScript and server-side scripting using PHP. 			
Module-1			
Traditional HTML, XHTML and HTML5:			
Introduction to HTML, What is HTML and Where did it come from? First Look at HTML and XHTML , HTML Syntax, Semantic Markup, Structure of HTML Documents, Quick Tour of HTML Elements, HTML5 Semantic Structure Elements.			
TextBook 1 : 2.1,2.2,2.3,2.4,2.5,2.6			8 Hours
Module-2			
Cascading Style Sheets (CSS)			
Introduction, CSS Overview, CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Font Properties, Text Properties, Element Box, padding Property, margin Property			
TextBook 2 : Chapter 3			8 Hours
Module-3			
Tables and Forms, Links and Images.			
HTML Tables and Forms, Introducing Tables, Styling Tables, Introducing Forms, Form Control Elements, CSS for Links, Responsive Images, Positioning Images.			
TextBook 1 : Chapter 4.1,4.2,4.3,4.4			
TextBook 2 : Chapter 6.7, 6.12,7.2			8 Hours
Module-4			
JavaScript: Client-Side Scripting			
Introduction, Hello World Web Page, Buttons, Functions, Variables, Identifiers, Conditional statements, loops and JavaScript objects, Document Object Model, Forms and How They're Processed: form Element, Controls, Text Control, Accessing a Form's Control Values, reset and focus Methods.			
TextBook 1: 6.4, 6.5			
TextBook 2: 8.1, 8.3 to 8.13, 8.15, 8.16			8 Hours
Module-5			
Introduction to Server-Side Development with PHP			
Introduction to Server-Side Development with PHP, What is Server-Side Development, Quick Tour of PHP, Program Control, PHP Arrays, \$_GET and \$_POST Super global Arrays, \$_SESSION.			
TextBook 1: 8.1,8.3,8.4,9.1.1,9.2			8 Hours
List of Laboratory Experiments related to above modules – 2 hours each			
Programming Assignments:			
<ol style="list-style-type: none"> 1. Create an XHTML page using tags to accomplish the following: <ol style="list-style-type: none"> (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
 - (iv) 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	<i>SubjectA</i>
		<i>SubjectB</i>
		<i>SubjectC</i>
	Sem2	<i>SubjectE</i>
		<i>SubjectF</i>
		<i>SubjectG</i>
	Sem3	<i>SubjectH</i>
		<i>SubjectI</i>
		<i>SubjectJ</i>

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 meta tag
4. Demonstrate the following HTML5 Semantic tags- <article>, <aside>,<details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>,<section> for a webpage that gives information about 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 to the left
- Also demonstrate list style type with user defined image logos
7. Create following web page using HTML and CSS with tabular layout

Sign up today

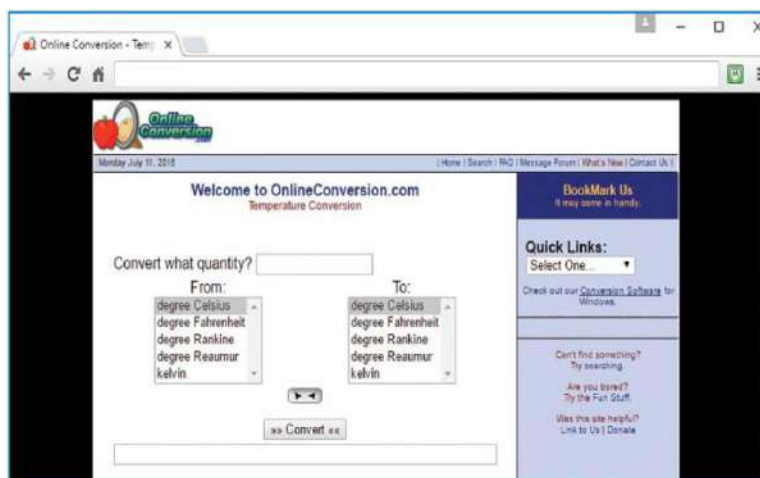
Name:

E-mail:

Password:

Confirm password:

8. Implement a button that, when clicked, reassigns the form's controls to their original values. The button should be labelled "Start over." Your solution should not use an event handler. Just show the input element, nothing else.
9. Create a Web page that uses a form to performs temperature conversions as shown below.



Note the quantity text control at the top, the result text control at the bottom, the two list boxes at the sides, and the convert button in the centre. All those controls are inside a form. Behind the scenes, the convert button has a JavaScript event handler. When the user clicks the button and submits the form, the event handler code reads the form's input values, does the calculation, and displays the result.

10. Create a login form to enter the login credentials. Upon submitting the form , perform the client-side and server-side validation. Redirect the user to a WELCOME PAGE, if the user has entered valid credentials.

1. Open ended experiment covering the concept of entire syllabus

Course Outcomes:

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

22PLC15A/25A.1	Identify the various versions of HTML and its effect on web page development
22PLC15A/25A.2	Create web pages using HTML and Cascading Style Sheets.
22PLC15A/25A.3	Construct and visually format tables and forms using HTML and CSS
22PLC15A/25A.4	Build dynamic web pages using JavaScript.
22PLC15A/25A.5	Use server-side scripting with PHP to generate and display web contents dynamically.
22PLC15A/25A.6	Demonstrate an understanding of where HTML, CSS, JavaScript, and PHP are interpreted and run.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Fundamentals of Web Development	Randy Connolly, Ricardo Hoar	Pearson Education India.	1 st Edition, 2015

2	WEB PROGRAMMING with HTML5, CSS and JavaScript	John Dean	Jones & Bartlett Learning	1 st Edition, 2019
Reference Books				
1	HTML & CSS	Thomas A. Powell	Tata McGraw Hill.	5 th Edition, 2010
2	JavaScript & jQuery: The Missing Manual	David Sawyer McFarland	O'Reilly/Shroff Publishers & Distributors Pvt Ltd.	1 st Edition, 2014
3	Learning PHP, MySQL & JavaScript with jQuery, CSS and HTML5	Robin Nixon	O'Reilly Publications.	4 th Edition, 2015

Web links/Video Lectures/MOOCs/papers

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

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22PLC15A/25A.1			2		2									
22PLC15A/25A.2			2		2									
22PLC15A/25A.3			2		2									
22PLC15A/25A.4			2		2		2							
22PLC15A/25A.5			2		2		2							
22PLC15A/25A.6			2		2		2							

1: Low 2: Medium 3: High

Programming Language Course: Introduction to Python Programming			
Course Code	22PLC15B/25B	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:2)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Apply the syntax and semantics of the Python programming language. 2. Illustrate the process of structuring the data using lists, tuples, Dictionaries. 3. Implement looping constructs and functions to manipulate strings. 4. Demonstrate the use of built-in functions to navigate the file system. 5. Implement the program for file organization 			
Module-1			
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, 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()			
Textbook 1: Chapters 1 – 2			8 Hours
Module-2			
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.			
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.			
Textbook 1: Chapters 3– 4			8 Hours
Module-3			
Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Nested Dictionaries			
Manipulating Strings: Working with Strings, Useful String Methods, Project: Adding Bullets to Wiki Markup			
Textbook 1: Chapters 5-6			8 Hours
Module-4			
Pattern Matching with Regular Expressions: Finding Patterns of Text without Regular expression, Finding Patterns of Text with Regular expression, More Pattern Matching with Regular Expression, Greedy and Non-greedy matching, Findall() method, Character classes, Making your own character classes, the Caret and Dollar sign Characters, Wildcard Characters, Case-insensitive matching, Substituting strings with sub() method.			
Textbook 1: Chapters 7			8 Hours
Module-5			
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.			
Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module.			
Textbook 1: Chapters 8-9			8 Hours

List of Laboratory Experiments related to above modules – 2 hours each

1. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
2. a) Guess the Number: Write a program that tells the player that it has come up with a secret number and will give the player six chances to guess it. The code that lets the player enter a guess and checks that guess is in a for loop that will loop at most six times.
b) Write a python program to find the area of square, rectangle and circle using user defined functions. Take input from the user and print the results.
3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
4. Write a program to play tic-tac-toe board game using Dictionary
5. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with a suitable message.
6. Implement Password Locker program using command line arguments and clipboard.
7. 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(), readline(), and write()].
8. 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.
9. Write a function named DivExp which takes TWO parameters a, b and returns a value c ($c=a/b$). Write a 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.

10. Case Study:

Generating Random Quiz Files:

Say you're a geography teacher with 35 students in your class and you want to give a pop quiz on US state capitals. Alas, your class has a few bad eggs in it, and you can't trust the students not to cheat. You'd like to randomize the order of questions so that each quiz is unique, making it impossible for anyone to crib answers from anyone else. Of course, doing this by hand would be a lengthy and boring affair and hence we need a python program to automate the task.

Here is what the program does:

- Creates 35 different quizzes.
- Creates 50 multiple-choice questions for each quiz, in random order.
- Provides the correct answer and three random wrong answers for each question, in random order.
- Writes the quizzes to 35 text files.
- Writes the answer keys to 35 text files.

After you run the program, this is how your capitalsquiz1.txt file will look, though of course your questions and answer options may be different from those shown here, depending on the outcome of your random.shuffle() calls:

Name:

Date:

Period:

State Capitals Quiz (Form 1)

1. What is the capital of West Virginia?

- A. Hartford
- B. Santa Fe
- C. Harrisburg
- D. Charleston

2. What is the capital of Colorado?

- A. Raleigh
- B. Harrisburg
- C. Denver
- D. Lincoln

Course Outcomes:

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

22PLC15B/25B.1	Implement python programs to solve problems using flow control and decision-making constructs.
22PLC15B/25B.2	Implement looping constructs and functions in python programs and Design, create and execute python programs to solve problems using lists.
22PLC15B/25B. 3	Design, create and execute python programs to solve problems using core data structures like dictionaries and Implement Python Programs using Strings
22PLC15B/25B.4	Implement regular expressions in python program
22PLC15B/25B. 5	Develop a python program to manipulate the files
22PLC15B/25B.6	Develop programs for file organization.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Automate the Boring Stuff with Python	Al Sweigart	No Starch Press	1st Edition, 2015
Reference Books				
1	Python for Everybody: Exploring Data Using Python 3	Charles R. Severance	Shroff Publishers	1st Edition, 2017
2	Introduction to Computer Science Using Python	Charles Dierbach,	Wiley	1st Edition, 2015
3	Introduction to Python Programming	Gowrishankar S, Veena A,	CRC Press	1st Edition, 2018

Web links/Video Lectures/MOOCs/papers

1. <https://www.learnbyexample.org/python/>
2. <https://www.learnpython.org/>
3. <https://pythontutor.com/visualize.html#mode=edit>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22PLC15B/25B.1			2											
22PLC15B/25B.2			2											
22PLC15B/25B.3			2											
22PLC15B/25B.4			2											
22PLC15B/25B.5			2		2									
22PLC15B/25B.6			2											

1: Low 2: Medium 3: High

Programming Language Course: Basics of Java Programming			
Course Code	22PLC15C/25C	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:2)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Discuss the fundamental features of object oriented language and JAVA. 2. Set up a Java JDK environment to create, debug and run simple Java programs. 3. Explain object oriented concepts using programming examples. 4. Discuss the concepts of importing packages and exception handling mechanisms. 			
Module-1			
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.			
Textbook 1: Ch 2, Ch 3			8 Hours
Module-2			
Operators : Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java’s Selection Statements, Iteration Statements, Jump Statements.			
Textbook 1: Ch 4, Ch 5			8 Hours
Module-3			
Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, Garbage Collection, The finalize() Method.			
Textbook 1: Ch 6			8 Hours
Module-4			
A Closer Look at Methods and Classes: Overloading Methods, Introducing Access Control, Understanding static, Introducing final			
Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Using Abstract Classes, Using final with Inheritance			
Textbook 1: Ch7, Ch 8			8 Hours
Module-5			
Packages : Packages, Importing Packages			
Exception-Handling : Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, throw, throws, finally			
Textbook 1: Ch 9, Ch 10			8 Hours
List of Laboratory Experiments related to above modules – 2 hours each			
<ol style="list-style-type: none"> 1. Write a JAVA program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula. 2. Write a JAVA program for multiplication of two arrays. 3. Write a JAVA program to sort a list of elements in ascending and descending order. 4. Create a JAVA class called Student with the following details as variables within it. 			

USN
NAME
BRANCH
PHONE
PERCENT AGE

Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.

5. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing 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.
6. Write a JAVA program demonstrating Method overloading and Constructor overloading.
7. 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 of access modifiers (private, public, protected, default) in all these classes using JAVA.
8. 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 arrayIndexOutOfBounds Exception.

9. Open ended experiment covering the concept of entire syllabus

Course Outcomes:

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

22PLC15C/25C.1	Explain the features and object oriented concepts in JAVA programming
22PLC15C/25C.2	Explain working of operators and control statements in JAVA
22PLC15C/25C.3	Write programs based on polymorphism and inheritance
22PLC15C/25C.4	Write the concepts of packages and Interfaces
22PLC15C/25C.5	Develop programs using the concepts of exception handling mechanism
22PLC15C/25C.6	Develop simple java programs to solve real world problems

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Java The Complete Reference	Herbert Schildt	Tata McGraw Hill	7th Edition, 2007
Reference Books				
1	Programming with Java	Mahesh Bhavne , Sunil Patekar	Pearson	First Edition, 2008
2	Java How to Program	Paul Deitel, Harvey Deitel	Pearson	11th Edition, 2018

Web links/Video Lectures/MOOCs/papers

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

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22PLC15C/25C.1	3	-	1	-	3	-	-	-	-	-	-	-	-	-
22PLC15C/25C.2	-	-	2	-	-	-	-	-	-	-	-	-	2	-
22PLC15C/25C.3	3	-	-	-	-	2	-	-	-	-	-	-	-	-
22PLC15C/25C.4	3	-	-	-	-	1	-	-	-	-	-	-	1	-
22PLC15C/25C.5	3	-	3	-	-	-	-	-	-	-	-	-	-	-
22PLC15C/25C.6	-	-	3	-	3	-	-	-	-	-	2	-	-	-

1: Low 2: Medium 3: High

Programming Language Course: Introduction to C++ Programming			
Course Code	22PLC15D/25D	CIE Marks	50
Teaching Hours/Week (L:T:P)	(2:0:2)	SEE Marks	50
Credits	03	Exam Hours	03
Course Learning Objectives:			
7. Understanding about object-oriented programming and gain knowledge about the capability to store information in an object 8. Understand the capability of a class to rely upon another class and functions 9. Understand about constructors which are special type of functions 10. Create and process data in files using file I/O functions 11. Use the generic programming features of C++ including Exception handling.			
Module-1			
Introduction to Object Oriented Programming: Computer programming background-C++ overview. First C++ Program -Basic C++ syntax, variables, Constants, Keywords, Conditional statements, Loops: For, While, Do while, Object Oriented Programming: What is an object, Class, Arrays, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism. Textbook 1: Chapter 1(1.3 to 1.7), Chapter 2(2.1 to 2.2) Textbook 2: Chapter 1(2.1 - 2.8) 8 Hours			
Module-2			
Objects, Functions in C++: Tokens – Keywords – Identifiers and constants – Basic data types, Operators in C++ – Scope resolution operator – Expressions and their types – Special assignment expressions – Function prototyping – Call by reference – Return by reference – Inline functions -Default arguments, Function overloading. Textbook 1: Chapter 1 (1.8,1.9), Chapter 2(2.3 to 2.6) Textbook 2: Chapter3 (3.2 to 3.14, 3.19,3.20), Chapter 4 (4.1to 4.9) 8 Hours			
Module-3			
Dynamic memory management: Introduction, Dynamic memory allocation, Dynamic memory deallocation, Constructors and Destructors, this keyword. Textbook 1: Chapter 3 (3.1 to 3.3), Chapter 4 (4.1,4.2) Textbook 2: Chapter 5(5.3 to 5.12), Chapter 6(6.2 to 6.8) 8 Hours			
Module-4			
Inheritance & Polymorphism: Derived class Constructors, Destructors-Types of Inheritance- Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance. Textbook 1: Chapter 5(5.1- 5.7) Textbook 2: Chapter 8 (8.1- 8.8) 8 Hours			
Module-5			
Exception Handling: Introduction to Exception - Benefits of Exception handling- Try and catch block Throw statement. Predefined exceptions in C++. Textbook 1: Chapter 10 (10.1, 10.3) Textbook 2: Chapter 13 (13.2-13.5) 8 Hours			
List of Laboratory Experiments related to above modules – 2 hours each			
2. Write a C++ program to sort the elements in ascending and descending order. 3. Write a C++ program to find the sum of all the natural numbers from 1 to n. 4. Write a C++ program to swap 2 values by writing a function that uses call by value technique. 5. Write a C++ program to swap 2 values by writing a function that uses call by reference			

technique

swap(int a, int b), swap(double a, double b)

6. 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.
7. Write a C++ program to create member functions and access them in your program using different access specifiers.
8. Write a C++ program to dynamically create constructors using copy constructors and default constructors and access the member functions.
9. Suppose we have three classes: Vehicle, FourWheeler, and Car. The class Vehicle is the base class, the class FourWheeler is derived from it and the class Car is derived from the class FourWheeler. Class Vehicle has a method 'vehicle' that prints 'I am a vehicle', class FourWheeler has a method 'fourWheeler' 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(), fourWheeler(), 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.
10. Write a function which throws a division by zero exception and catch it in the catch block. Write a C++ program to demonstrate usage of try, catch and throw to handle exceptions.
11. Write a C++ program function which handles array out of bounds exception using C++.

12. Open ended experiment covering the concept of entire syllabus

Course Outcomes:

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

22PLC15D/25D.1	Able to understand and design the solution to a problem using object-oriented programming concepts
22PLC15D/25D.2	Able to understand and implement basic programs using conditional statements and loops.
22PLC15D/25D.3	Able to reuse the code with extensible Class types, User-defined operators and function Overloading
22PLC15D/25D.4	Able to understand and use memory allocation and deallocation techniques.
22PLC15D/25D.5	Achieve code reusability and extensibility by means of Inheritance and Polymorphism
22PLC15D/25D.6	Implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Object-Oriented Programming with C++	Sourav Sahay	Oxford Press	Second Edition, 2012.
2	Object Oriented Programming with C++	Balagurusamy E	Tata McGraw Hill Education Pvt. Ltd	Fourth Edition 2010
Reference Books				
1	The Complete Reference C++	Herbert Schildt	Tata McGraw Hill Pvt.Ltd	4 th Edition, 2003
2	C++ Primer	Stanley B. Lippmann, Josee Lajore	Pearson education	4 th Edition, 2005

<p>Web links/Video Lectures/MOOCs/papers</p> <p>1. Basics of C++ https://www.youtube.com/watch?v=BCIS40yzssA</p> <p>2. Functions of C++ https://www.youtube.com/watch?v=p8ehAjZWjPw3</p>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22PLC15D/25D.1	3	-	1	-	3	-	-	-	-	-	-	-	-	-
22PLC15D/25D.2	-	-	2	-	-	-	-	-	-	-	-	-	2	-
22PLC15D/25D.3	3	-	-	-	-	2	-	-	-	-	-	-	-	-
22PLC15D/25D.4	3	-	-	-	-	1	-	-	-	-	-	-	1	-
22PLC15D/25D.5	3	-	3	-	-	-	-	-	-	-	-	-	-	-
22PLC15D/25D.6	-	-	3	-	3	-	-	-	-	-	2	-	-	-

1: Low 2: Medium 3: High

Course Title:	Communicative English		
Course Code:	22ENG16/26	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
Course objectives: The course Communicative English (22ENG16) will enable the students,			
<ol style="list-style-type: none"> To know about Fundamentals of Communicative English and Communication Skills in general. To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills. To impart basic English grammar and essentials of important language skills. To enhance with English vocabulary and language proficiency for better communication skills. To learn about Techniques of Information Transfer through presentation. 			
Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.			
Module-1		(03 hours)	
Introduction to Communicative English : Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.			
Module-2		(03 hours)	
Introduction to Phonetics : Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.			
Module-3		(03 hours)	
Basic English Communicative Grammar and Vocabulary PART - I : Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it.			
Module -4		(03 hours)	
Basic English Communicative Grammar and Vocabulary PART - II: Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.			
Module-5		(03 hours)	
Communication Skills for Employment : Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises.			

Course outcome (Course Skill Set):

CO1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
CO2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.
CO3	To impart basic English grammar and essentials of language skills as per present requirement.

CO4	Understand and use all types of English vocabulary and language proficiency.
CO5	Adopt the Techniques of Information Transfer through presentation.
CO6	Demonstrate competence in the four modes of literacy: Writing, Reading, Speaking and listening.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Communication Skills	Sanjay Kumar & Pushp Lata	Oxford University Press India Pvt Ltd	Second edition 2015
2	A Textbook of English Language Communication Skills	Infinite Learning Solutions	Bengaluru	Revised edition 2022
Reference Books				
1	Technical Communication	Gajendra Singh Chauhan and Et al	Cengage learning India Pvt Limited [Latest Revised Edition]	2019
2	English for Engineers	N.P.Sudharshana and C.Savitha	Cambridge University Press	2018
3	English Language Communication Skills – Lab Manual cum Workbook	Lab Manual cum Workbook	Cengage learning India Pvt Limited [Latest Revised Edition]	2014
4	A Course in Technical English – D Praveen Sam, KN Shoba	D Praveen Sam, KN Shoba	Cambridge University Press	2020
5	Practical English Usage	Michael Swan	Oxford University Press	2016

<p>Web links/Video Lectures/MOOCs</p> <p>1.https://englishforeveryone.org</p> <p>2.https://owl.purdue.edu</p> <p>3.http://guidetogrammar.org</p>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
22ENG16.1	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22ENG16.2	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22ENG16.3	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22ENG16.4	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22ENG16.5	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22ENG16.6	2	-	-	-	-	-	-	-	-	3	-	-	-	-

1: Low 2: Medium 3: High

Course Title:	Professional Writing Skills in English		
Course Code:	22PWS16/26	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
Course objectives: The course Professional Writing Skills in English (22PWS26) will enable the students,			
<ol style="list-style-type: none"> 1. To Identify the Common Errors in Writing and Speaking of English. 2. To Achieve better Technical writing and Presentation skills for employment. 3. To read Technical proposals properly and make them to write good technical reports. 4. To Acquire Employment and Workplace communication skills. 5. To learn about Techniques of Information Transfer through presentation in different level. 			
Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.			
Module-1 (3 Hours)			
Identifying Common Errors in Writing and Speaking English : Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.			
Module-2 (3 Hours)			
Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Sentence arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words.			
Module-3 (03 Hours)			
Technical Reading and Writing Practices: Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.			
Module-4 (03 Hours)			
Professional Communication for Employment: Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails, Blog Writing and Memos.			
Module-5 (03 Hours)			
Professional Communication at Workplace: Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's, Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills.			

Course Outcomes: At the end of the course Professional Writing Skills in English (22PWS26) the student will be able to:	
22PWS26.1	To understand and identify the Common Errors in Writing and Speaking.
22PWS26.2	To Achieve better Technical writing and Presentation skills.
22PWS26.3	To read Technical proposals properly and make them to Write good technical reports.

22PWS26.4	Acquire Employment and Workplace communication skills.
22PWS26.5	To learn about Techniques of Information Transfer through presentation in different level.
22PWS26.6	To Communicate Professionally at workplace.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Professional Writing Skills in English	Fillip Learning	Education (ILS), Bangalore	2022
2	Functional English	As per AICTE 2018 Model Curriculum	Cengage learning India Pvt Limited	First edition 2019
Reference Books				
1	English for Engineers	N.P.Sudharshana and C.Savitha	Cambridge University Press	8 th Edition 2018
2	Technical Communication	Gajendra Singh Chauhan and Et al	Cengage learning India Pvt Limited	First Edition 2019
3	Technical Communication – Principles and Practice,	Meenakshi Raman and Sangeetha Sharma	Oxford University Press	2017 Third Edition
4	High School English Grammar & Composition	Wren and Martin	S Chandh & Company Ltd	Regular Edition 2017
5	Effective Technical Communication	M Ashraf Rizvi	McGraw Hill Education (India) Private	2 nd Edition 2017

Web links/Video Lectures/MOOCs

- 1.<https://englishforeveryone.org>
- 2.<https://owl.purdue.edu>
- 3.<http://guidetogrammar.org>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22PWS26.1	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22PWS26.2	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22PWS26.3	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22PWS26.4	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22PWS26.5	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22PWS26.6	2	-	-	-	-	-	-	-	-	3	-	-	-	-

1: Low 2: Medium 3: High

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - (ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತ್ರಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ)

Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:	22KSK17 / 27	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
<p>Course objectives : ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು The course (22KSK17/27) will enable the students,</p> <ol style="list-style-type: none"> 1. ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುತ್ತಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು 2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು. 3. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು. 4. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು. 5. ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. 			
<p>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.</p> <ol style="list-style-type: none"> 1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು. 2. ಇತೀಚಿನ 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 ಟಿಪ್ಪಣಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು. 3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು. 			
ಘಟಕ - 1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಬಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು		(03 hours)	
<ol style="list-style-type: none"> 1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ 2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ 3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ 			
ಘಟಕ - 2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ		(03 hours)	
<ol style="list-style-type: none"> 1. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ 2. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು 3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ 			
ಘಟಕ - 3 ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ		(03 hours)	
<ol style="list-style-type: none"> 1. ದಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು 2. ಕುರುಡು ಕಾಂಚಾಣ : ದಾ.ರಾ. ಬೇಂದ್ರೆ 3. ಹೊಸಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು 			

ಘಟಕ - 4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ	(03 hours)
1. ಡಾ.ಸರ್.ಎಂ.ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ. ಎನ್. ಮೂರ್ತಿರಾವ್ 2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ: ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ	
ಘಟಕ - 5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ	(03 hours)
1. ಯುಗಾದಿ: ವಸುದೇಂದ್ರ 2. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ	

Course Outcomes: ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (22KSK17/27) ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ : At the end of the course the student will be able to:	
22KSK17/27.1	ಕನ್ನಡ ಬಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ
22KSK17/27.2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮಾಡುತ್ತದೆ
22KSK17/27.3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಾಗುತ್ತದೆ
22KSK17/27.4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ
22KSK17/27.5	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳು- ವ್ಯಕ್ತಿ ಪರಿಚಯ ಹಾಗೂ ಕತೆಯ ತಂತ್ರಗಾರಿಕೆ
22KSK17/27.6	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು

University Prescribed Textbook: ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಡಾ.ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ, ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ ವಿಶೇಷ ಸೂಚನೆ: 1. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮಕ್ಕೆ ಸೀಮಿತವಾಗಿ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ ಇರುತ್ತದೆ. 2 ಮೇಲಿನ ಪಠ್ಯಕ್ರಮವನ್ನು ಹೊರತುಪಡಿಸಿದ ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿನ ಉಳಿದ ಪದ್ಯ & ಗದ್ಯ ಭಾಗ ಹಾಗೂ ಇತರ ಲೇಖನಗಳನ್ನು ಹೆಚ್ಚುವರಿ ಪೂರಕ ಓದಿಗಾಗಿ ಬಳಸಿಕೊಳ್ಳಬಹುದು. ಅಂತಿಮ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಈ ಪಾಠಗಳಿಂದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುವುದಿಲ್ಲ. =====

Web links/Video Lectures/MOOCs/papers 1. https://youtu.be/HS8InQR36E4 2. https://youtu.be/C_SF24_ygxQ 3. https://youtu.be/wuT7UED7yuQ 4. https://youtu.be/pxLwNWXhbnQ 5. https://youtu.be/H6FXRSBNO4c

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	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
22KSK17/27.1	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22KSK17/27.2	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22KSK17/27.3	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22KSK17/27.4	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22KSK17/27.5	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22KSK17/27.6	2	-	-	-	-	-	-	-	-	3	-	-	-	-

1: Low 2: Medium 3: High

Course Title:	ಬಳಕೆ ಕನ್ನಡ		
Course Code:	22KKBK17 / 27	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
Course objectives:			
The course (22KKBK17/27) 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 conversation.			
5. To know about Karnataka state and its language, literature and General information about this state.			
Module – 1 (03 hours)			
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 conversation, Listening and Speaking Activities, Key to Transcription.			
3. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ / ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು: - Personal Pronouns, Possessive Forms, Interrogative words			
Module – 2 (03 hours)			
1. Possessive forms of nouns, dubitive question and Relative nouns: ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು			
2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು: Qualitative, Quantitative and Colour Adjectives, Numerals			
3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು -ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - (ಅ, ಅದು, ಅವು, ಅಲ್ಲಿ) : Predictive Forms, Locative Case			
Module – 3 (03 hours)			
1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು : Dative Cases, and Numerals			
2. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಕಗಳು : Ordinal numerals and Plural markers			
3. ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು & ವರ್ಣ ಗುಣವಾಚಕಗಳು: Defective/Negative Verbs & Colour Adjectives			
Module – 4 (03 hours)			
1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು : Permission, Commands, encouraging and Urging words (Imperative words and sentences)			
2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು: Accusative Cases and Potential Forms used in General Communication			
3. 'ಇರು ಮತ್ತು ಇರಲ್ಲ' ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು : Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs			
4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ, ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ - Comparitive, Relationship, Identification and Negation Words			
Module – 5 (03 hours)			
1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು : Different types of Tense, Time and Verbs			
2. ದ್, -ತ್, -ತು, - ಇತ್ತು, - ಆಗಿ, - ಅಲ್ಲ, -ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು			

ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ: Formation of Past, Future and Present Tense Sentences with Verb Forms

3. Kannada Vocabulary List :ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು

Course Outcomes (Course Skill Set):

ಬಳಕೆ ಕನ್ನಡ (22KBK17/27) ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು

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

22KBK17/27.1	To understand the necessity of learning of local language for comfortable life.
22KBK17/27.2	To speak, read and write Kannada language as per requirement.
22KBK17/27.3	To communicate (converse) in Kannada language in their daily life with kannada speakers.
22KBK17/27.4	To Listen and understand the Kannada language properly.
22KBK17/27.5	To speak in polite conversation.
22KBK17/27.6	Develop skills, vocabulary and fluency

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Balake Kannada	Dr L Thimmasha	Prasaranga VTU Belagavi	First edition 2022
2	Vyavaharika Kannada	Dr L Thimmasha, Prof V Keshavamoorthy	Prasaranga VTU Belagavi	
Reference Books				
1	Kannada Kali	Lingadevaru Halemane	Kannada University Hampi	Fourth edition 2016
2	Spoken Kannada	N. D Krishnamurthy, Dr S. M. Rameshchandra Swamy, Abdul Rehman Pasha	Kannada Sahithya Parishat	2018

Web links/Video Lectures/MOOCs/papers

1. <https://youtu.be/daY6TRvHFB4> , 2. <https://youtu.be/RuRmq7VyCaQ>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
22KBK17/27.1	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
22KBK17/27.2	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
22KBK17/27.3	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
22KBK17/27.4	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
22KBK17/27.5	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
22KBK17/27.6	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-

1: Low 2: Medium 3: High

Course Title:	Indian Constitution		
Course Code:	22ICO17 / 27	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
Course objectives :			
The course INDIAN CONSTITUTION (22ICO17 / 27) will enable the students,			
<ol style="list-style-type: none"> 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. 			
Module-1		(03 hours)	
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)	
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)	
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)	
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)	
State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.			

Course Outcomes: At the end of the course Indian Constitution 22ICO17/27 the student will be able to:	
22IC017/27.1	Discuss the constitutional knowledge and legal literacy
22IC017/27.2	Review the Indian constitution
22IC017/27.3	Analyze the role and functions of Union and state executives
22IC017/27.4	Review the Parliamentary Committees, Important Parliamentary Terminologies, Judicial System of India
22IC017/27.5	Discuss the Judicial System of India
22IC017/27.6	Review the Electoral Process, the System of Election Commission and its functions

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Constitution of India (for Competitive Exams)	Naidhruva Edutech	Learning Solutions, Bengaluru	2022
2	“Introduction to the Constitution of India”	Durga Das Basu	(DD Basu): Prentice –Hall	24 th edition 2019
Reference Books				
1	Constitution of India, Professional Ethics and Human Rights”	Shubham Singles, Charles E. Haries, and et al	Cengage Learning India, Latest Edition	2019
2	The Constitution of India	Merunandan K B	Merugu Publication, Bengaluru	Second Edition
3	Samvidhana Odu - for Students & Youths	Justice HN Nagamohan Dhas, Sahayana, kerekon.	Prentice – Hall	2004

Web links/Video Lectures/MOOCs/papers

1. https://www.constitutionofindia.net/constitution_of_india
2. <https://infosecawareness.in/cyber-laws-of-india>

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22ICO17/27.1						2		2						
22ICO17/27.2								2				2		
22ICO17/27.3						2		2				2		
22ICO17/27.4						2		2						
22ICO17/27.5						2		2						
22ICO17/27.6								2				2		

1: Low 2: Medium 3: High

Course Title:	Scientific Foundations of Health		
Course Code:	22SFH18/28	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	1:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01
Course objectives			
The course Scientific Foundations of Health (22SFH18/28) will enable the students,			
<ol style="list-style-type: none"> 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 			
Module-1		(03 hours)	
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)	
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)	
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)	
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)	
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 Outcomes: At the end of the course Scientific Foundations of Health (22SFH18/28) the student will be able to:	
22SFH18/28.1	To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.
22SFH18/28.2	Develop the healthy lifestyles for good health for their better future.
22SFH18/28.3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life.

22SFH18/28.4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.
22SFH18/28.5	Prevent and fight against harmful diseases for good health through positive mindset.
22SFH18/28.6	To Manage chronic illness for quality of life.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Scientific Foundations of Health	Dr. L Thimmsha and Dr. Mahesh Lohith K S	VTU-University Website	2022
2	Scientific Foundations of Health	Dr. L Thimmsha and Dr. Mahesh Lohith K S	Infinite Learning Solutions, Bangalore	2022
3	Health Psychology - A Textbook	Jane Ogden	Open University Press	4th Edition, 2007
Reference Books				
1	Health Psychology	Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor	Routledge London	Second Edition 2016
2	Health Psychology	Shelley E. Taylor	McGraw Hill Education (India) Private Limited	Tenth Edition 2018

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22SFH18/28.1	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22SFH18/28.2	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22SFH18/28.3	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22SFH18/28.4	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22SFH18/28.5	2	-	-	-	-	-	-	-	-	3	-	-	-	-
22SFH18/28.6	2	-	-	-	-	-	-	-	-	3	-	-	-	-

1: Low 2: Medium 3: High

Prototype Fabrication and Testing			
Course Code:	22PFT18/28	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	SEE Marks	50
Credits	01	Exam Hours	03
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Understand basic Manufacturing Processes used in the industry 2. Apply the advanced Manufacturing Processes in their Project work 3. Articulate embedded electronics and basics of electrical wiring 4. Apply the basic knowledge of design thinking in project work 5. Create a prototype using the skill learnt as a team in the project work 			
Module 1 Basic manufacturing process			
<p><u>Carpentry</u> - Hand tools & machines, Types of joints, and Pattern making. <u>Sheet Metal Practice</u> - Bending, punching, and drawing various sheet metal joints, development of joints. <u>Joining</u> - Temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners, and fusion technologies <u>Safety in Workshop</u> - Fire hazards, electric short circuit –causes and remedies, Machine protection, Human protection, Accident prevention methods, developing ability to observe safe working habits. <u>Wood Lathe.</u> <u>Basics of drilling, milling and grinding operations.</u> 08 Hours</p>			
Module 2 Basic electronic fabrication and test practices			
<p>Basic electronic components, PCB design and fabrication- etching and milling, Electronic testing equipment, Basic electrical wiring 06 Hours</p>			
Module 3 Advanced manufacturing process			
<p>Part modelling and 3D printing, 3D scanners, Laser cutting and engraving, CNC wood router, Vinyl Cutter and Power tool operations 06 Hours</p>			
Module 4 Basics of Design Thinking (For CIE only)			
<p>Definition of Design Thinking, need for Design Thinking, Objective of Design Thinking, Stages of Design Thinking Process– Empathize, Define, Ideate, Prototype, Test (explain with examples) 02 Hours</p>			
Course Outcomes:			
At the end of the course, the student will be able to:			
22PFT18/28.1	perform basic manufacturing operations used in the industry		
22PFT18/28.2	use the advanced manufacturing processes for prototype building		
22PFT18/28.3	develop simple PCB boards using etching and milling process		
22PFT18/28.4	use basic electronic components and test its working		
22PFT18/28.5	apply design thinking to product development		
22PFT18/28.6	inculcate the teamwork and communication skills		

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Reference Books				
1	Fab Lab: Revolution Field Manual	Niggli Verlag	Massimo Menichinelli	2017
2	Skill Development and Entrepreneurship in India	Rameshwari Pandya	Ingram short title	2016
3	101 Design Methods: A Structured Approach for Driving Innovation in Your Organization	Vijay Kumar	Wiley	2012

Web links/Video Lectures

- <https://fabacademy.org/>
- <https://www.youtube.com/watch?v=gHGN6hs2gZY&t=33s>
- <https://www.youtube.com/watch?v=4nTh3AP6knM>

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
22PFT18.1			3											
22PFT18.2	2	3		3	3									
22PFT18.3	2	3												
22PFT18.4	2	3												
22PFT18.5		3	3											
22PFT18.6									3	3	3			

1: Low 2: Medium 3: High

Industry Oriented Training : Mathematical Aptitude Skills (Common to all Programmes)			
Course Code	22ITM19/29	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	-
Credits	-	Exam Hours	02
Course Learning Objectives:			
1. To equip the students with basic concepts and tools of Mathematics to solve placement aptitude papers. 2. To enhance the problem solving skills and improve the basic mathematical skills to help students preparing for competitive examinations.			
Module-1			
Number System: Various types of Numbers; Tests of Divisibility; HCF and LCM; Roots and Squares. Algebra: Identities; BODMAS Rule; Logarithms; Indices; Number Series; Simple Interest and Compound Interest. 4 Hours			
Module-2			
Time and Work: Facts and Formulae; Group work; Pipes and Cisterns. Time and Distance: Basics of Time, Speed and Distance; Average journey speed; Relative Speeds; Boats and Streams. 4 Hours			
Module-3			
Average, Percentage, Age problems: Average; Concept of percentage, Results on Population and Depreciation; Problems on ages. Profit and Loss: Profit and Loss formulae; Percentage of profit and loss, Discount. 4 Hours			
Module-4			
Permutations, Combinations, Probability: Factorial Notation; Permutations; Combinations; Random Experiment; Probability of Occurrence of events. Ratio, Proportion, Partnership: Ratio; Ratio in terms of Percentage, Proportion, Mean Proportion; Variation; Partnership. 4 Hours			
Module-5			
Geometry: Pythagoras theorem - Heights and Distances; Area; Volume; Surface Area. Clock and Calendar: Problems related to clocks; Calendars; odd days; leap year; Day of the week related to Odd days. 4 Hours			
Course Outcomes:			
At the end of the course the student will be able to:			
22ITM19/29.1	Apply the basic concepts of quantitative abilities related to Number system.		
22ITM19/29.2	Evaluate time related problems by knowing the relationship between time/speed/distance or time/work.		
22ITM19/29.3	Apply the concepts of average, percentage, appreciation and depreciation in real life problems		
22ITM19/29.4	Solve application problems involving permutations and combinations.		

22ITM19/29.5	Apply Ratio and Proportion concepts to solve the partnership problems where people share the ownership.
22ITM19/29.6	Apply the geometrical concepts in real- world applications.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Quantitative Aptitude for Competitive Examinations	Dr R S Aggarwal	S. Chand & Company LTD	44 th Edition 2018
2	Quantitative Aptitude for Competitive Examination	R.K Tyagi	MTG Learning Media	First Edition 2018

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22ITM19/29.1	-	-	-	-	-	1	-	-	2	-	-	-
22ITM19/29.2	-	-	-	-	-	-	-	-	2	-	-	1
22ITM19/29.3	-	-	-	-	-	1	-	-	2	-	-	-
22ITM19/29.4	-	-	-	-	-	-	-	-	2	-	-	-1
22ITM19/29.5	-	-	-	-	-	1	-	-	2	-	-	-
22ITM19/29.6	-	-	-	-	-	-	-	-	2	-	-	1

1: Low 2: Medium 3: High

Industry Oriented Training- Problem Solving Skills (Common to all Programs)			
Course Code	22ITP19/29	CIE Marks	50
Teaching Hours/Week (L:T:P)	(0:2:0)	SEE Marks	-
Credits	-	Exam Hours	2
Course Learning Objectives:			
<ol style="list-style-type: none"> 1. Develop thinking capacity in solving simple problems. 2. Learn the fundamentals of skill development. 3. Identify the nuances of effective communication 4. Perform a SWOT analysis to understand the personality traits. 5. Learn to be a part of the team and become effective team players. 6. Discuss the importance of developing problem-solving skills. 			
Module-1			4 Hours
How to pick up Skills faster? Knowledge v/s Skill, Skill introspection, Skill acquisition, Engineering Graduate v/s Engineer			
Building Interpersonal & Intrapersonal Skills: Peer communication, Social interactions, Bonding Emotional Management, Moral, social & personal responsibilities.			
Module-2			4 Hours
Professional Etiquettes: Workplace etiquette, Dining etiquettes, Telephone etiquettes, E-mail etiquettes.			
Change Management: Tolerance of change and uncertainty, Joining the bandwagon, Adapting change for growth-overcoming inhibition, Adapt to changes.			
Module-3			4 Hours
Self-Awareness & Goal Setting: Identifying your Unique Selling proposition, SWOT, Nurture strengths, Fixing weaknesses, Overcoming complacency, Building confidence, Ambition/SMART Goals, Managing Failures.			
Leadership & Motivation: Types of leadership styles, Case studies, Motivation, Qualities of a leader.			
Module-4			4 Hours
Team Building: Difference between team and group, Qualities of an effective team player, Stages of team building, Problem-solving among team members, Building winning teams.			
Module-5			4 Hours
Problem Solving: Styles of problem solvers, Effective problem solving, Case studies, Individual/teams.			
Creative Thinking: Examples of creative thinking, Tools of creativity, Creative/critical thinking.			

Course Outcomes:	
At the end of the course the student will be able to:	
22ITP19.1/29.1	Apply rational thinking abilities in solving real life problems.
22ITP19.2/29.2	Develop the required skills to effectively interact with people and to articulate the ideas.
22ITP19.3/29.3	Discover strengths and weaknesses and apply them effectively for career growth.
22ITP19.4/29.4	Recognize the dynamics of a team and achieve synergy.
22ITP19.5/29.5	Practice team leadership through active group participation and be able to identify, shape their leadership skills
22ITP19.6/29.6	Demonstrate strategies for using skills in problem solving

Text Books:				
Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Think Smarter: Critical Thinking to Improve Problem-Solving and Decision-Making Skills	Michael Kallet	Wiley India Pvt Ltd	1st edition, 2014
2	The Road Less Traveled	M Scott Peck	Touchstone (February 4, 2003)	Anniversary Edition, 2003
3	The Five Dysfunctions of a Team	Patrick Lencioni	Wiley India Pvt Ltd	1st edition, 2006
Reference Books:				
Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Stop Guessing: The 9 Behaviors of Great Problem Solvers	Nat Greene	Berrett-Koehler	1st edition, 2017
2	The 7 Habits of Highly Effective People	Stephen R Covey	Free Press	15th Anniversary Edition, 2004
3	Problem Solving 101: A Simple Book for Smart People	Ken Watanabe	Portfolio	1st Edition, 2009

Weblinks:

- <https://www.youtube.com/watch?v=A9Q20hZ5ZX4>
- <https://www.youtube.com/watch?v=L4N1q4Rni9I>
- <https://www.coursera.org/search?query=problem%20solving%20and%20critical%20thinking>
- <https://www.coursera.org/learn/visionary-leadership-meaning-maker>
- <https://www.coursera.org/learn/interpersonal-communication>

Course Articulation Matrix

Course Outcomes (COs)	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22ITP19.1/29.1	-	-	-	-	-	-	-	-	3	3	-	2
22ITP19.2/29.2	-	-	-	-	-	-	-	-	3	3	-	2
22ITP19.3/29.3	-	-	-	-	-	-	-	-	3	3	-	2
22ITP19.4/29.4	-	-	-	-	-	-	-	-	3	3	-	2
22ITP19.5/29.5	-	-	-	-	-	-	-	-	3	3	-	2
22ITP19.6/29.6	-	-	-	-	-	-	-	-	3	3	-	2

1: Low 2: Medium 3: High

Core Values of the Institution

SERVICE

A Josephite will keep service as the prime goal in everything that is undertaken. Meeting the needs of the stakeholders will be the prime focus of all our endeavors.

EXCELLENCE

A Josephite will not only endeavor to serve, but serve with excellence. Preparing rigorously to excel in whatever we do will be our hallmark.

ACCOUNTABILITY

Every member of the SJEC Family will be guided to deliver on assurances given within the constraints set. A Josephite will always keep budgets and deadlines in mind when delivering a service.

CONTINUOUS ADAPTATION

Every member of the SJEC Family will strive to provide reliable and continuous service by adapting to the changing environment.

COLLABORATION

A Josephite will always seek to collaborate with others and be a team-player in the service of the stakeholders.

Objectives

- Provide Quality Technical Education facilities to every student admitted to the College and facilitate the development of all round personality of the students.
- Provide most competent staff and excellent support facilities like laboratory, library and internet required for good education on a continuous basis.
- Encourage organizing and participation of staff and students in in-house and outside Training programmes, seminars, conferences and workshops on continuous basis.
- Provide incentives and encouragement to motivate staff and students to actively involve in research-innovative projects in collaboration with industry and R&D centres on continuous basis
- Invite more and more number of persons from industry from India and abroad for collaboration and promote Industry-Institute Partnership.
- Encourage consultancy and testing and respond to the needs of the immediate neighbourhood.



St Joseph Engineering College

AN AUTONOMOUS INSTITUTION

Affiliated to VTU, Belagavi | Recognised by AICTE, New Delhi

Accredited by NAAC with A+ Grade

B.E. (CSE, ECE, EEE, ME, CIV) & MBA Accredited by NBA, New Delhi

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