



**RAMAIAH**  
Institute of Technology

**CURRICULUM**  
**Outcome Based Education**  
**(Effective from the Academic Year 2022 – 2023)**

**I & II Semester**

**COMMON TO ALL BRANCHES**

**RAMAIAH INSTITUTE OF TECHNOLOGY**  
(Autonomous Institute, Affiliated to VTU)  
Approved by AICTE, New Delhi & Govt. of Karnataka  
Accredited by NBA & NAAC with A<sup>+</sup> Grade

## About the Institute:

Dr. M. S. Ramaiah a philanthropist, founded 'Gokula Education Foundation' in 1962 with an objective of serving the society. M S Ramaiah Institute of Technology (MSRIT) was established under the aegis of this foundation in the same year, creating a landmark in technical education in India. MSRIT offers 17 UG programs and 15 PG programs. All these programs are approved by AICTE. All eligible UG and PG programs are accredited by National Board of Accreditation (NBA). The institute is accredited with '**A<sup>+</sup>**' grade by **NAAC in March 2021** for 5 years. University Grants Commission (UGC) & Visvesvaraya Technological University (VTU) have conferred Autonomous Status to MSRIT for both UG and PG Programs since 2007. The institute is also been conferred autonomous status for Ph.D program since 2021. The institute is a participant to the Technical Education Quality Improvement Program (TEQIP), an initiative of the Government of India. The institute has 380 competent faculty out of which 65% are doctorates. Some of the distinguished features of MSRIT are: State of the art laboratories, individual computing facility for all faculty members, all research departments active with sponsored funded projects and more than 300 scholars pursuing Ph.D. To promote research culture, the institute has established Centre of Excellence for Imaging Technologies, Centre for Advanced Materials Technology, Centre for Antennas and Radio Frequency systems (CARFS), Center for Cyber Physical Systems, Schneider Centre of Excellence & Centre for Bio and Energy Materials Innovation. **M S Ramaiah Institute of Technology has obtained "Scimago Institutions Rankings" All India Rank 107 & world ranking 600 for the year 2022.**

The Entrepreneurship Development Cell (EDC) and Section 8 company "Ramaiah Evolute" have been set up on campus to incubate startups. **M S Ramaiah Institute of Technology is recognized by Atal Ranking of Institutions on Innovation Achievements (ARIIA), MoE, Govt. of India.** MSRIT has a strong Placement and Training department with a committed team, a good Mentoring/Proctorial system, a fully equipped Sports department, large air-conditioned library with good collection of book volumes and subscription to International and National Journals. The Digital Library subscribes to online e-journals from Elsevier Science Direct, IEEE, Taylor & Francis, Springer Link, etc. MSRIT is a member of DELNET, CMTI and VTU E- Library Consortium. MSRIT has a modern auditorium and several hi-tech conference halls with video conferencing facilities. The institute has excellent hostel facilities for boys and girls. MSRIT Alumni have distinguished themselves by occupying high positions in India and abroad and are in touch with the institute through an active Alumni Association.

**As per the National Institutional Ranking Framework (NIRF), MoE, Government of India, M S Ramaiah Institute of Technology has achieved 67<sup>th</sup> rank among 1249 top Engineering Institutions.**

**17<sup>th</sup> Rank for School of Architecture in India for the year 2022 and is 1<sup>st</sup> amongst the Engineering Colleges affiliated to VTU, Karnataka.**

## **VISION OF THE INSTITUTE**

To be an Institution of International Eminence, renowned for imparting quality technical education, cutting edge research and innovation to meet global socio-economic needs

## **MISSION OF THE INSTITUTE**

RIT shall meet the global socio-economic needs through

- Imparting quality technical education by nurturing a conducive learning environment through continuous improvement and customization
- Establishing research clusters in emerging areas in collaboration with globally reputed organizations
- Establishing innovative skills development, techno entrepreneurial activities and consultancy for socio-economic needs

## **QUALITY POLICY**

We at Ramaiah Institute of Technology strive to deliver comprehensive, continually enhanced, global quality technical and management education through an established Quality Management System complemented by the synergistic interaction of the stake holders concerned

### **About the Departments:**

#### **DEPARTMENT OF MATHEMATICS:**

The major focus of the department is to inculcate mathematical thinking in engineering students. For this, we teach core mathematics courses to students at undergraduate and postgraduate level as well as offer electives in mathematics. The department has a staff strength of 23 members. At present, there are 22 Ph.D. holders. Current expertise of the faculty covers a broad range of areas including Fluid mechanics, Linear Algebra, Numerical Methods, Number Theory, Probability, Statistics and Queuing Theory. The department faculty have published many papers in national and international journals. In addition, the faculty members have also obtained extramural support to carry out research activities and projects sponsored by VTU, UGC, DST and TEQIP.

### **Vision**

To mould the students to have strong Mathematical and analytical skills to meet the challenges open to them

### **Mission**

To provide the students with a strong Mathematical foundation through courses which cater to the needs of industry, research and higher education.

### **DEPARTMENT OF PHYSICS:**

The Physics department of RIT has a team of dynamic and well qualified faculty (all with Ph.D.) with a passion for research. Majority of them have more than 15 years of teaching experience and 10 years of research experience. The Department has very good infrastructure, well equipped spacious laboratories, computational and research facilities. Physics department of RIT is recognized as a research center by VTU in 2008 to offer Ph.D. programs. Eight students have been awarded Ph.D. degree from the department till now and presently 10 students are pursuing Ph.D. Six research projects with external funding to the tune of Rs. 60 lakhs from BRNS and VGST have been successfully completed. One International Conference and two Faculty Development Programmes (FDP) have been successfully conducted by the department in last one year. 30 research papers have been published in International peer reviewed journals with high impact factor in last one year. Total research publications in National / International Journals from 2008 to till date is 200.

### **Vision**

To develop undergraduate courses of best academic standards comparable to universities of international repute and be a catalytic agent to help students to manifest their latent potential.

### **Mission**

To provide the best training through teaching and research to enable the students to master the concepts in physics and apply successfully to real time problems and kindle their interest in cutting edge research areas.

## **DEPARTMENT OF CHEMISTRY:**

The Chemistry Department is one of the oldest Departments (established in 1962) of Ramaiah Institute of Technology. The Department consists of eleven well qualified and experienced faculty and one visiting professor. The Department also has five non-teaching staff. The Department aims at preparing the students for careers in all the fields of engineering aspects and also carry out basic and applied research work. The main activity of the department is to teach engineering chemistry theory and Laboratory courses to the under graduate engineering students of all disciplines. Department is also involved in teaching Technical chemistry for III semester BE chemical engineering students, along with respective laboratory and also handling open electives for higher semester students. The department is a recognized research centre by VTU. All faculty members are actively engaged in research work. Fifteen research scholars have registered for Ph.D. and awarded 13 Ph.D.'s. The faculty members of the Department have published about 50 research papers in reputed international journals in the current academic year. The department has been conducting FDP's and zero-budget programs regularly for Research scholars.

### **Vision**

Department strives for development of curriculum viewing emerging trends in technology with a balanced approach towards Institute Industry interaction and academic excellence along with research in basic sciences.

### **Mission**

Providing outstanding teaching and quality training in chemistry to all students at all levels and in all disciplines and also develop and maintain research programs of national and international relevance and serve the society through unique expertise and talent found in the department.

## **DEPARTMENT OF HUMANITIES:**

The Department of Humanities has seven faculty members, with three doctorates. The department engages in teaching Communicative English, Constitution of India, Kannada, Communication skills for BE/BArch students. Apart from this the department runs special classes/bridge courses in Communicative English to train NRI and rural students in English language usage. The faculty members engage in teaching-learning

activities, research publications and conducting workshops for students to build social skills and broaden critical and creative competencies.

The department is also equipped with an English Language lab located in LHC block. First Year BE students take this course as a part of the subject Communicative English, Building Vocabulary, Grammar, Listening, Speaking skills, Power Point presentations and Group activities form integral part of the course.

### **Vision**

The department of Humanities, RIT aspires to achieve excellence in teaching and training the young engineering students in the areas of humanities and social sciences through outcome based quality education and nurture them to emerge as professional leaders, lifelong learners and responsible citizens of global community.

### **Mission**

The mission of the department is to offer courses that aim to strengthen the students' creative and critical thinking, problem solving abilities, communication skills and broaden intellectual perspectives, to understand and deal with social realities through continuous learning experiences.

## PROGRAM OUTCOMES (POs):

- PO1: Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems:** Use research - based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**UG 1<sup>st</sup> Year Scheme for 2022-23 Batch  
SCHEME OF TEACHING**

**Computer Science & Engineering Stream – for students of CSE, ISE, CSE (AI&ML), CSE (Cyber Security),  
AI&ML, AI&DS and BT**

**(Effective from the Academic Year 2022-23)**

<b>I SEMESTER (PHYSICS CYCLE)</b>									
SL. No.	Course Code	Course Title	Teaching Department	Category	Credits			Total Contact hours / week	
					L	T	P		Total
1	MAC11	Advanced Calculus and Modular Arithmetic	Mathematics	ASC(IC)	2	1	1	4	6
2	PYC12	Engineering Physics	Physics	ASC	2	1	0	3	4
3	ESC13x	Engineering Science Course-I	CV,ME,EEE,ECE	ESC	3	0	0	3	3
4	PLC14x	Programming Language Courses	Any Department	PLC	2	0	1	3	4
5	HSCP15/25	Communicative English	Humanities	HSMC	1	0	0	1	2
6	HSCP16/26	Kannada Kali/ Kannada Manasu	Humanities	HSMC	1	0	0	1	1
7	AECP17/27	A Scientific Approach to Health	Respective Departments	AEC	1	0	0	1	1
8	PPC18	Principles of Programming Using C	CSE, ISE, CSE (CS), AI&ML,AI&DS,ISE	ESC(IC)	2	0	1	3	4
9	PYLC19	Engineering Physics Laboratory	Physics	ASC	0	0	1	1	2
<b>Total</b>					<b>14</b>	<b>2</b>	<b>4</b>	<b>20</b>	<b>27</b>

Where x= 1,2,3,4

One-hour Lecture (L) per week=|Credit Two hours Tutorial(T) per week=|Credit Two hours Practical / Drawing (P) per week=1 Credit

NOTE: Students of Computer Science & Engineering, Information Science & Engineering, Computer Science & Engineering (AI&ML), Computer Science & Engineering (Cyber Security), Artificial Intelligence & Machine Learning, Artificial Intelligence & Data Science and Biotechnology shall opt for any one of the courses from the ESC-I group except, ESC145-Introduction to C Programming

ASC-Applied Science Course, ESC-Engineering Science Courses, AEC- Ability Enhancement Course, HSMC-Humanity and Social Science and Management Course,

PLC- Programming Language Courses, IC – Integrated Course (Theory Course Integrated with Practical Course



Engineering Science Courses-I			Programming Language Courses				
SL. No.	Subject Code	Subject	Teaching Department	SL. No.	Subject Code	Subject	Teaching Department
1	ESC131	Introduction to Civil Engineering	CV	1	PLC141	Introduction to Web Programming	
2	ESC132	Introduction to Electrical Engineering	EEE	2	PLC142	Introduction to Python Programming	Any Department
3	ESC133	Introduction to Electronics Engineering	ECE,ETE	3	PLC143	Basics of JAVA programming	
4	ESC134	Introduction to Mechanical Engineering	ME	4	PLC144	Introduction to C++ Programming	
5	ESC135	Introduction to C Programming	Any Department				

**Student's 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 Motivating (Inspiring)

Activities are to be covered over a period of 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.

**AICTE Activity Points** to be earned by students admitted to BE/ B.Tech., / B. Plan 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, the 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.

**Scheme of Teaching**  
**Computer Science & Engineering Stream – for students of CSE, ISE, CSE(AI&ML), CSE (Cyber Security), AI&ML,**  
**AI&DS and BT**

**(Effective from the academic year 2022-23**

<b>II SEMESTER (CHEMISTRY CYCLE)</b>									
SL. No.	Subject Code	Subject	Teaching Department	Category	Total Credits			Contact hours / week	
					L	T	P		
1	MAC21	Numerical Techniques and Differential Equations	Mathematics	ASC(IC)	2	1	1	4	6
2	CYC22	Engineering Chemistry	Chemistry	ASC	3	0	0	3	3
3	ESC23x	Engineering Science Course-II	CV,ME,EEE,ECE	ESC	3	0	0	3	3
4	ETC24x	Emerging Technology Course	Any Department	ETC	3	0	0	3	3
5	HSCC15/25	Professional Writing Skills in English	Humanities	HSMC	1	0	0	1	2
6	HSCC16/26	Constitution of India	Humanities	HSMC	1	0	0	1	1
7	AECC17/27	Design Thinking	Respective Departments	AEC	2	0	0	2	2
8	MELC28	Computer-Aided Engineering Drawing Laboratory	ME	ESC	0	1	1	2	4
9	CYLC29	Engineering Chemistry Laboratory	Chemistry	ASC	0	0	1	1	2
<b>Total</b>					<b>15</b>	<b>2</b>	<b>3</b>	<b>20</b>	<b>26</b>

Where x= 1,2,3,4,....

One-hour Lecture (L) per week= |Credit Two hours Tutorial(T) per week= |Credit Two hours Practical / Drawing (P) per week= |Credit

**NOTE:** Students of Computer Science & Engineering, Information Science & Engineering, Computer Science & Engineering (AI&ML), Computer Science & Engineering (Cyber Security), Artificial Intelligence & Machine Learning, Artificial Intelligence & Data Science and Biotechnology shall opt for any one of the courses from the ESC-II group except, ESC245-Introduction to C Programming

**ASC-**Applied Science Course, **ESC-** Engineering Science Courses, **ETC-** Emerging Technology Course, **AEC-** Ability Enhancement Course, **HSMC-** Humanity and Social Science and Management Course, **IC –** Integrated Course (Theory Course Integrated with Practical Course)

Engineering Science Courses-II			Emerging Technology Courses				
SL. No.	Subject Code	Subject	Teaching Department	SL. No.	Subject Code	Subject	Teaching Department
1	ESC231	Introduction to Civil Engineering	CV	1	ETC241	Green Buildings	Any Department
2	ESC232	Introduction to Electrical Engineering	EEE	2	ETC242	Operation and Maintenance of Solar Electric Systems	
3	ESC233	Introduction to Electronics Engineering	ECE,ETE	3	ETC243	Introduction to Sustainable Engineering	
4	ESC234	Introduction to Mechanical Engineering	ME	4	ETC244	Renewable Energy Sources	
5	ESC235	Introduction to C Programming	Any Department	5	ETC245	Introduction to Internet of Things(IoT)	
				6	ETC246	Introduction to Cyber Security	

**Scheme of Teaching**  
**Civil Engineering Stream – for students of CV**  
**(Effective from the academic year 2022-23)**

<b>I SEMESTER (PHYSICS CYCLE)</b>									
SL. No.	Subject Code	Subject	Teaching Department	Category	Total Credits			Contact hours / week	
					L	T	P		Total
1	MAV11	Advanced Calculus	Mathematics	ASC(IC)	2	1	1	4	6
2	PYV12	Engineering Physics	Physics	ASC	2	1	0	3	4
3	ESC13x	Engineering Science Course-I	CSE,ME,EEE,ECE	ESC	3	0	0	3	3
4	PLC14x	Programming Language Courses	Any Department	PLC	2	0	1	3	4
5	HSCP15/25	Communicative English	Humanities	HSMC	1	0	0	1	2
6	HSCP16/26	Kannada Kali/ Kannada Manasu	Humanities	HSMC	1	0	0	1	1
7	AACP17/27	A Scientific Approach to Health	Respective Departments	AEC	1	0	0	1	1
8	CVV18	Civil Engineering Mechanics	CV	ESC(IC)	3	0	0	3	3
9	PYLV19	Engineering Physics Laboratory	Physics	ASC	0	0	1	1	2
<b>Total</b>					<b>15</b>	<b>2</b>	<b>3</b>	<b>20</b>	<b>26</b>

Where x= 1,2,3,4,....

One-hour Lecture (L) per week=|Credit Two hours Tutorial(T) per week=|Credit Two hours Practical / Drawing (P) per week=|Credit

**NOTE:** Students of Civil Engineering shall opt for any one of the courses from the ESC-I group except, ESC141-Introduction to Civil Engineering

**ASC-**Applied Science Course, **ESC-** Engineering Science Courses, **AEC-** Ability Enhancement Course, **HSMC-**Humanity and Social Science and Management Course,

**PLC-** Programming Language Courses, **IC** – Integrated Course (Theory Course Integrated with Practical Course)

Engineering Science Courses-I			Programming Language Courses				
SL. No.	Subject Code	Subject	Teaching Department	SL. No.	Subject Code	Subject	Teaching Department
1	ESC131	Introduction to Civil Engineering	CV	1	PLC141	Introduction to Web Programming	Any Department
2	ESC132	Introduction to Electrical Engineering	EEE	2	PLC142	Introduction to Python Programming	
3	ESC133	Introduction to Electronics Engineering	ECE,E TE	3	PLC143	Basics of JAVA programming	
4	ESC134	Introduction to Mechanical Engineering	ME	4	PLC144	Introduction to C++ Programming	
5	ESC135	Introduction to C Programming	Any Department				

**Student's 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 Motivating (Inspiring)

Activities are to be covered over a period of 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.

**AICTE Activity Points** to be earned by students admitted to BE/ B. Tech., / B. Plan 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, the 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.

**Scheme of Teaching**  
**Civil Engineering Stream – for students of CV**  
**(Effective from the academic year 2022-23)**

<b>II SEMESTER (CHEMISTRY CYCLE)</b>									
SL. No.	Subject Code	Subject	Teaching Department	Category	Total Credits			Contact hours / week	
					L	T	P		Total
1	MAV21	Multivariate Calculus and Differential Equations	Mathematics	ASC(IC)	2	1	1	4	6
2	CYV22	Engineering Chemistry	Chemistry	ASC	3	0	0	3	3
3	ESC23x	Engineering Science Course-II	GSE,ME,EEE,FCE	ESC	3	0	0	3	3
4	ETC24x	Emerging Technology Course	Any Department	ETC	3	0	0	3	3
5	HSCC15/25	Professional Writing Skills in English	Humanities	HSMC	1	0	0	1	2
6	HSCC16/26	Constitution of India	Humanities	HSMC	1	0	0	1	1
7	AECC17/27	Design Thinking	Respective Departments	AEC	2	0	0	2	2
8	MELV28	Computer-Aided Engineering Drawing Laboratory	ME	ESC	0	1	1	2	4
9	CYLV29	Engineering Chemistry Laboratory	Chemistry	ASC	0	0	1	1	2
<b>Total</b>					<b>15</b>	<b>2</b>	<b>3</b>	<b>20</b>	<b>26</b>

Where x= 1,2,3,4,....

One-hour Lecture (L) per week= 1Credit Two hours Tutorial(T) per week= 1Credit Two hours Practical / Drawing (P) per week= 1Credit

**NOTE:** Students of Civil Engineering shall opt for any one of the courses from the ESC- II group except, ESC241-Introduction to Civil Engineering

ASC-Applied Science Course, ESC- Engineering Science Courses, AEC- Ability Enhancement Course, HSMC-Humanity and Social Science and Management Course, ETC- Emerging Technology Courses, IC – Integrated Course (Theory Course Integrated with Practical Course)

Engineering Science Courses-II					Emerging Technology Courses				
SL. No.	Subject Code	Subject	Teaching Department	SL. No.	Subject Code	Subject	Teaching Department		
1	ESC231	Introduction to Civil Engineering	CV	1	ETC241	Green Buildings	Any Department		
2	ESC232	Introduction to Electrical Engineering	EEE	2	ETC242	Operation and Maintenance of Solar Electric Systems			
3	ESC233	Introduction to Electronics Engineering	ECE,ETE	3	ETC243	Introduction to Sustainable Engineering			
4	ESC234	Introduction to Mechanical Engineering	ME	4	ETC244	Renewable Energy Sources			
5	ESC235	Introduction to C Programming	Any Department	5	ETC245	Introduction to Internet of Things(IoT)			
				6	ETC246	Introduction to Cyber Security			

**Scheme of Teaching**  
**Electrical & Electronics Engineering Stream – for students of ECE, EEE, EIE, ETE and MLE**  
**(Effective from the academic year 2022-23)**

<b>I SEMESTER (CHEMISTRY CYCLE)</b>									
SL. No.	Subject Code	Subject	Teaching Department	Category	Total Credits			Contact hours / week	
					L	T	P		Total
1	MAE11	Advanced Calculus and Linear Algebra	Mathematics	ASC(IC)	2	1	1	4	6
2	CYE12	Engineering Chemistry	Chemistry	ASC	3	0	0	3	3
3	ESC13x	Engineering Science Course-I	CSE,ME,CV,EEE,ECE	ESC	3	0	0	3	3
4	ETC14x	Emerging Technology Course	Any Department	ETC	3	0	0	3	3
5	HSCC15/25	Professional Writing Skills in English	Humanities	HSMC	1	0	0	1	2
6	HSCC16/26	Constitution of India	Humanities	HSMC	1	0	0	1	1
7	AECC17/27	Design Thinking	Respective Departments	AEC	2	0	0	2	2
8	MELE18	Computer-Aided Engineering Drawing Laboratory	ME	ESC	0	1	1	2	4
9	CYLE19	Engineering Chemistry Laboratory	Chemistry	ASC	0	0	1	1	2
<b>Total</b>					<b>15</b>	<b>2</b>	<b>3</b>	<b>20</b>	<b>26</b>

Where x= 1,2,3,4,....

One-hour Lecture (L) per week=LCredit Two hours Tutorial(T) per week=LCredit Two hours Practical / Drawing (P) per week=LCredit

**NOTE:** Students of Electrical & Electronics Engineering shall opt for any one of the courses from the ESC-I group except, ESC132-Introduction to Electrical Engineering and students of Electronics & Communication Engineering/ Electronics & Telecommunication Engineering / Electronics & Instrumentation Engineering /Medical Electronics Engineering students shall opt any one of the courses from ESC-I except ESC133 Introduction to Electronics Engineering

**ASC-**Applied Science Course, **ESC-** Engineering Science Courses, **AEC-** Ability Enhancement Course, **HSMC-**Humanity and Social Science and Management Course, **ETC-** Emerging Technology Courses, **IC** – Integrated Course (Theory Course Integrated with Practical Course)



Engineering Science Courses-I				Emerging Technology Courses			
SL. No.	Subject Code	Subject	Teaching Department	SL. No.	Subject Code	Subject	Teaching Department
1	ESC131	Introduction to Civil Engineering	CV	1	ETC141	Green Buildings	Any Department
2	ESC132	Introduction to Electrical Engineering	EEE	2	ETC142	Operation and Maintenance of Solar Electric Systems	
3	ESC133	Introduction to Electronics Engineering	ECE,ETE	3	ETC143	Introduction to Sustainable Engineering	
4	ESC134	Introduction to Mechanical Engineering	ME	4	ETC144	Renewable Energy Sources	
5	ESC135	Introduction to C Programming	Any Department	5	ETC145	Introduction to Internet of Things(IoT)	
				6	ETC146	Introduction to Cyber Security	

**Student's Induction Program:**

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**AICTE Activity Points** to be earned by students admitted to BE/ B. Tech., / B. Plan 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, the 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.

**Scheme of Teaching**  
**Electrical & Electronics Engineering Stream – for students of ECE, EEE, EIE, ETE and MLE**  
**(Effective from the academic year 2022-23)**

<b>II SEMESTER (PHYSICS CYCLE)</b>									
SL. No.	Subject Code	Subject	Teaching Department	Category	Total Credits			Contact hours / week	
					L	T	P		
1	MAE21	Differential Equations and Laplace Transforms	Mathematics	ASC(IC)	2	1	1	4	6
2	PYE22	Engineering Physics	Physics	ASC	2	1	0	3	4
3	ESC23x	Engineering Science Course-II	CV,ME,CSE	ESC	3	0	0	3	3
4	PLC24x	Programming Language Courses	Any Department	PLC	2	0	1	3	4
5	HSCP15/25	Communicative English	Humanities	HSMC	1	0	0	1	2
6	HSCP16/26	Kannada Kali/ Kannada Manasu	Humanities	HSMC	1	0	0	1	1
7	AACP17/27	A Scientific Approach to Health	Respective Departments	AEC	1	0	0	1	1
	EEE28	Elements of Electrical Engineering	EEE	ESC	2	1	0	3	3
8		OR							
	BEE28	Basic Electronics	ECE	ESC	2	1	0	3	3
9	PYLE29	Engineering Physics Laboratory	Physics	ASC	0	0	1	1	2
				<b>Total</b>	<b>14</b>	<b>3</b>	<b>3</b>	<b>20</b>	<b>26</b>

Where x= 1,2,3,4,....

One-hour Lecture (L) per week=LCredit Two hours Tutorial(T) per week=LCredit Two hours Practical / Drawing (P) per week=LCredit

**NOTE:**

- Students of Electrical & Electronics Engineering have to study EEE28- Elements of Electrical Engineering compulsorily whereas students of Electronics & Communication Engineering/ Electronics & Telecommunication Engineering / Electronics & Instrumentation Engineering /Medical Electronics Engineering have to study BEE28 Basic Electronics compulsorily
- Students of Electrical & Electronics Engineering shall opt for any one of the courses from the ESC-II group except, ESC232-Introduction to Electrical Engineering and students of Electronics & Communication Engineering/ Electronics & Telecommunication Engineering / Electronics & Instrumentation Engineering /Medical Electronics Engineering students shall opt any one of the courses from ESC-I except ESC233 Introduction to Electronics Engineering

ASC-Applied Science Course, ESC- Engineering Science Courses, AEC- Ability Enhancement Course, HSMC-Humanity and Social Science and Management Course, PLC- Programming Language Courses, IC – Integrated Course (Theory Course Integrated with Practical Course)

Engineering Science Courses-II					Programming Language Courses		
SL. No.	Subject Code	Subject	Teaching Department	SL. No.	Subject Code	Subject	Teaching Department
1	ESC231	Introduction to Civil Engineering	CV	1	PLC241	Introduction to Web Programming	Any Department
2	ESC232	Introduction to Electrical Engineering	EEE	2	PLC242	Introduction to Python Programming	
3	ESC233	Introduction to Electronics Engineering	ECE,ETE	3	PLC243	Basics of JAVA programming	
4	ESC234	Introduction to Mechanical Engineering	ME	4	PLC244	Introduction to C++ Programming	
5	ESC235	Introduction to C Programming	Any Department				

**Scheme of Teaching**  
**Mechanical Engineering Stream – for students of ME, IEM and CH**  
**(Effective from the academic year 2022-23)**

<b>I SEMESTER (CHEMISTRY CYCLE)</b>									
SL. No.	Subject Code	Subject	Teaching Department	Category	Total Credits			Contact hours / week	
					L	T	P Total		
1	MAM11	Advanced Calculus	Mathematics	ASC(IC)	2	1	1	4	6
2	CYM12	Engineering Chemistry	Chemistry	ASC	3	0	0	3	3
3	ESC13x	Engineering Science Course-I	CSE,CV,EEE,ECE	ESC	3	0	0	3	3
4	ETC14x	Emerging Technology Course	Any Department	ETC	3	0	0	3	3
5	HSCC15/25	Professional Writing Skills in English	Humanities	HSMC	1	0	0	1	2
6	HSCC16/26	Constitution of India	Humanities	HSMC	1	0	0	1	1
7	AECC17/27	Design Thinking	Respective Departments	AEC	2	0	0	2	2
8	MELM18	Computer-Aided Engineering Drawing Laboratory	ME	ESC	0	1	1	2	4
9	CYLM19	Engineering Chemistry Laboratory	Chemistry	ASC	0	0	1	1	2
<b>Total</b>					<b>15</b>	<b>2</b>	<b>3</b>	<b>20</b>	<b>26</b>

Where x= 1,2,3,4,....

One-hour Lecture (L) per week=1Credit Two hours Tutorial(T) per week=1Credit Two hours Practical / Drawing (P) per week=1Credit

**NOTE:** Students of Mechanical Engineering, Industrial Engineering, & Management and Chemical Engineering shall opt for any one of the courses from the ESC-I group except, ESC144-Introduction to Mechanical Engineering

ASC-Applied Science Course, ESC- Engineering Science Courses, AEC- Ability Enhancement Course, HSMC-Humanity and Social Science and Management Course, ETC- Emerging Technology Courses, IC – Integrated Course (Theory Course Integrated with Practical Course)

Engineering Science Courses-I			Emerging Technology Courses				
SL. No.	Subject Code	Subject	Teaching Department	SL. No.	Subject Code	Subject	Teaching Department
1	ESC131	Introduction to Civil Engineering	CV	1	ETC141	Green Buildings	Any Department
2	ESC132	Introduction to Electrical Engineering	EEE	2	ETC142	Operation and Maintenance of Solar Electric Systems	
3	ESC133	Introduction to Electronics Engineering	ECE,ETE	3	ETC143	Introduction to Sustainable Engineering	
4	ESC134	Introduction to Mechanical Engineering	ME	4	ETC144	Renewable Energy Sources	
5	ESC135	Introduction to C Programming	Any Department	5	ETC145	Introduction to Internet of Things(IoT)	
				6	ETC146	Introduction to Cyber Security	

**Student's 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 Motivating (Inspiring) Activities are to be covered over a period of 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.

**AICTE Activity Points** to be earned by students admitted to BE/ B. Tech., / B. Plan 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, the 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.

**Scheme of Teaching**  
**Mechanical Engineering Stream – for students of ME, IEM and CH**  
**(Effective from the academic year 2022-23)**

<b>II SEMESTER (PHYSICS CYCLE)</b>									
SL. No.	Subject Code	Subject	Teaching Department	Category	Total Credits			Contact hours / week	
					L	T	P		Total
1	MAM21	Multivariate Calculus and Differential Equations	Mathematics	ASC (IC)	2	1	1	4	6
2	PYM22	Engineering Physics	Physics	ASC	2	1	0	3	4
3	ESC23x	Engineering Science Course-II	GSE,CV,EEE,ECE	ESC	3	0	0	3	3
4	PLC24x	Programming Language Courses	Any Department	PLC	2	0	1	3	3
5	HSCP15/25	Communicative English	Humanities	HSMC	1	0	0	1	2
6	HSCP16/26	Kannada Kali/ Kannada Manasu	Humanities	HSMC	1	0	0	1	1
7	AECP17/27	A Scientific Approach to Health	Respective Departments	AEC	1	0	0	1	1
8	MEM28	Elements of Mechanical Engineering	ME	ESC	2	0	0	2	2
9	MELM29	Elements of Mechanical Engineering Lab/ Workshop	ME	ESC	0	0	1	1	2
10	PYLM210	Engineering Physics Laboratory	Physics	ASC	0	0	1	1	2
<b>Total</b>					<b>14</b>	<b>2</b>	<b>4</b>	<b>20</b>	<b>26</b>

Where x=1,2,3,4.....

One-hour Lecture (L) per week=1Credit Two hours Tutorial(T) per week=1Credit Two hours Practical / Drawing (P) per week=1Credit

**NOTE:** Students of Mechanical Engineering, Industrial Engineering, & Management and Chemical Engineering shall opt for any one of the courses from the ESC-II group except, ESC244-Introduction to Mechanical Engineering

**ASC-**Applied Science Course, **ESC-** Engineering Science Courses, **AEC-** Ability Enhancement Course, **HSMC-**Humanity and Social Science and Management Course, **PLC-** Programming Language Courses, **IC –** Integrated Course (Theory Course Integrated with Practical Course)

Engineering Science Courses-II					Programming Language Courses				
SL. No.	Subject Code	Subject	Teaching Department	SL. No.	Subject Code	Subject	Teaching Department		
1	ESC231	Introduction to Civil Engineering	CV	1	PLC241	Introduction to Web Programming	Any Department		
2	ESC232	Introduction to Electrical Engineering	EEE	2	PLC242	Introduction to Python Programming			
3	ESC233	Introduction to Electronics Engineering	ECE,ETE	3	PLC243	Basics of JAVA programming			
4	ESC234	Introduction to Mechanical Engineering	ME	4	PLC244	Introduction to C++ Programming			
5	ESC235	Introduction to C Programming	Any Department						

# Contents

Sl No.	Syllabus	Page No.
	<b>I SEMESTER</b>	
1	Computer Science & Engineering Stream	25
2	Civil Engineering Stream	50
3	Electrical & Electronics Engineering Stream	73
4	Mechanical Engineering Stream	94
	<b>II SEMESTER</b>	
5	Computer Science & Engineering Stream	115
6	Civil Engineering Stream	136
7	Electrical & Electronics Engineering Stream	157
8	Mechanical Engineering Stream	184
10	Engineering Science Courses (ESC)	210
11	Programming Language Courses (PLC)	228
12	Emerging Technology Courses (ETC)	245



**COMPUTER SCIENCE & ENGINEERING  
STREAM  
I SEMESTER**

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# ADVANCED CALCULUS AND MODULAR ARITHMETIC

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Course Code: MAC11

Credits: 2:1:1

Pre-requisites: -

Contact Hours: 28L+14T+14P

Course Coordinators: Dr. Monica Anand & Mr. B. Azghar Pasha

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## Course Content

### Unit I

**Differential Calculus-I:** Polar curves, angle between the radius vector and the tangent, angle between the curves, length of perpendicular from pole to the tangent, Pedal equations. Derivative of arc length & radius of curvature in cartesian, polar & parametric forms (All without proof).

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

### Unit II

**Partial Differentiation:** Partial derivatives, total differential coefficient, differentiation of composite and implicit functions. Jacobians and properties.

**Vector differentiation:** Scalar and vector fields, gradient of a scalar field, directional derivative, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector, Laplacian operator, physical interpretation of gradient, divergence and curl.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

### Unit III

**Multiple Integrals:** Evaluation of double and triple integrals, change of order of integration, change of variables. Areas and volumes using double and triple integrals. Beta and Gamma functions - properties (without proof).

- Pedagogy/Course delivery tools: Chalk and talk, power point presentation, videos
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

### Unit IV

**Vector Integration:** Line integrals, surface integrals and volume integrals. Green's theorem (with proof) and its applications, Stokes' theorem and Gauss divergence theorem (without proof) and its applications.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

## Unit V

**Modular Arithmetic:** Introduction to congruences, linear congruences, The Chinese remainder theorem, solving polynomials, linear diophantine equation, system of linear congruences, Euler's theorem, Wilson theorem and Fermat's little theorem. Applications of congruences-RSA algorithm.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111101137>

### List of Laboratory experiments (2 hours/week per batch)

1. Plotting cartesian and polar curves
2. Finding the radius of curvature of a given curve (Cartesian, polar and parametric)
3. Finding partial derivatives and Jacobian.
4. Finding gradient, divergence and curl of a given vector.
5. Evaluation of areas using double integrals.
6. Evaluation of volume using triple integrals.
7. Finding line integrals of vector point function .
8. Computing surface and volume integrals of vector point function .
9. Finding GCD using Euclid's algorithm.
10. Solve linear congruences.

**Suggested Software's:** MatLab/ SciLab

### Text Books:

1. **George B. Thomas, Maurice D. Weir, Joel R. Hass** - Thomas' Calculus, Pearson, 13th edition, 2014.
2. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44th edition, 2017.
3. **Thomas Koshy** – Elementary Number Theory with Applications, Academic Press, 2nd edition, 2008.

### Reference Books:

1. **Erwin Kreyszig** –Advanced Engineering Mathematics, Wiley publication, 10th edition, 2015.
2. **Srimanta Pal & Subodh C Bhunia** -Engineering Mathematics, Oxford University Press, 3rd Reprint, 2016.
3. **B. V. Ramana** - Higher Engineering Mathematics, Tata McGraw-Hill, 11th edition, 2010.
4. **William Stallings** - Cryptography and Network Security, Pearson Prentice Hall, 6th edition, 2013.

## Course Outcomes (COs):

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

1. Solve problems related to Polar curves, Radius of curvature and Jacobians. (PO-1, PO-2)
2. Apply vector differentiation to identify solenoidal and irrotational vectors. (PO-1, PO-2)
3. Evaluate multiple integrals and use them to find areas and volumes. (PO-1, PO-2)
4. Exhibit the interdependence of line, surface and volume integrals using integral theorems. (PO-1, PO-2)
5. Apply modular arithmetic to computer algorithms. (PO-1, PO-2)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two tests shall be taken		
<b>Lab components</b>		
Conducting Experiment and Laboratory Record	15	CO1, CO2, CO3, CO4, CO5
Lab Test	05	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer any one question from each unit – Internal choice)	100	CO1, CO2, CO3, CO4, CO5

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# ENGINEERING PHYSICS

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Course Code: PYC12

Credits: 2:1:0

Pre-requisites: Nil

Contact Hours: 28L+14T

Course Coordinator: Dr. Seema Agarwal

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## Course Content

### Unit I

#### Photonics

**Lasers:** Characteristics of LASER, Interaction of radiation with matter, Expression for energy density equation and its significance, Requisites of a Laser system, Conditions for Laser action, Principle, Construction and working of He-Ne laser, Semiconductor Laser, Application of Lasers – LIDAR, Bridge deflection and Laser Printing, Numerical problems.

**Optical Fibers:** Review of principle and Propagation mechanism in Fibers & TIR, Angle of acceptance, Numerical aperture, fractional index change, Modes of propagation, Number of modes and V parameter, Types of optical fibers, Attenuation and Mention of expression for attenuation coefficient, Applications: Point to point communication discussion with block diagram, Merits and demerits, Numerical problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=YHmGNDMV1cY>

### Unit II

#### Quantum Mechanics

de- Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity (Derivation-relation between  $V_p$  &  $V_g$ ), Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus-Relativistic), Principle of Complementarity, Wave Function, Physical Significance of a wave function and Born Interpretation, Time independent Schrodinger wave equation, Expectation value, Eigen functions and Eigen Values, Motion of a particle in a one dimensional potential well of infinite depth, Waveforms and Probabilities. Numerical Problems

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=h1tf1E-L2Dc&list=RDCMUCEik-U3T6u6JA0XiHLbNbOw&index=10>

### Unit III

#### Electrical Properties of Materials & its Application

**Electrical Conductivity in metals:** Resistivity and Mobility, Concept of Phonon, Matheissen's rule. Quantum free electron theory, Fermi energy, Fermi factor, F-D statistics, Density of states (Qualitative), Expression for EF (Derivation).

Superconductivity: Introduction to Superconductors, Temperature dependence of resistivity, Meissner Effect, Critical Current.

**Dielectric Properties:** Polar and non-polar dielectrics, Types of Polarization, internal fields in solid, Clausius- Mossotti equation(Derivation). Application of dielectrics in transformers, Capacitors, Electrical Insulation. Numerical Problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://youtu.be/VWk-GU0BSfw>

## Unit IV

### Quantum Computing

**Principles of Quantum Information & Quantum Computing:** Introduction to Quantum Computing, Moore's law & its end. Stern-Gerlach experiment, Polarisation of light, Single particle quantum interference, Classical & quantum information comparison. Differences between classical & quantum computing, quantum superposition and the concept of qubit.

**Wave Function in Ket Notation:** Matrix form of wave function, Identity Operator, Determination of  $|0\rangle$  and  $|1\rangle$ , Pauli Matrices and its operations on 0 and 1 states, Mention of Conjugate and Transpose, Unitary Matrix U, Examples: Row and Column Matrices and their multiplication (Inner Product), Probability, Orthogonality.

**Properties of a qubit:** Mathematical representation. Summation of probabilities, Representation of qubit by Bloch sphere.

**Quantum Gates:** Accounting for the extra-ordinary capability of quantum computing, Model Realizations.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://archive.nptel.ac.in/courses/115/101/115101092>

## Unit V

### Application of Physics in Computing

**Statistical Physics for Computing:** Descriptive statistics and inferential statistics, Poisson distribution and Normal Distributions (Bell Curves), Monte Carlo Method. Numerical Problems.

**Physics of Animation:** Taxonomy of physics based animation methods, Frames, Frames per Second, Size and Scale, Motion and Timing in Animations, Constant Force and Acceleration, The Odd rule, Motion Graphs, Numerical Calculations based on Odd Rule, Examples of Character Animation: Jumping, Walking. Numerical Problems

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: [https://www.youtube.com/watch?v=kj1kaA\\_8Fu4](https://www.youtube.com/watch?v=kj1kaA_8Fu4)

### Text Books:

1. **M.N. Avadhanulu and P.G. Kshirsagar:** A Text book of Engineering Physics, 10<sup>th</sup> revised Ed, S.Chand & Company Ltd, New Delhi
2. **Gaur and Gupta:** Engineering Physics, Dhanpat Rai Publishers, New Delhi, 8<sup>th</sup> revised edition 2017.

3. **S O Pillai:** Solid State Physics, 8<sup>th</sup> Ed- New Age International Publishers-2018.
4. **F. Reif:** Statistical Physics: Berkely Physics Course, Volume 5, McGraw Hill.

### Reference Books:

1. **Resnick, Halliday and Jearl Walker** - Fundamentals of Physics, John Wiley & Sons, Inc., 11<sup>th</sup> edition, 2018.
2. **Michele Bousquet and Alejandro Garcia-** Physics for Animators, , CRC Press, Taylor & Francis, 2016.
3. **Maria Luisa** - Quantum Computation and Logic: How Quantum Computers Have Inspired Logical Investigations, 2018

### Course Outcomes (COs):

On successful completion of the course students will be able to

1. Enumerate the principles of Photonic devices and their application relevant to civil engineering. (PO-1, PO-2, PO-12)
2. Distinguish between phase and group velocities; solve Schrödinger's time independent wave equation for the case of infinite potential well. (PO-1, PO-2, PO-12)
3. Apply the quantum theory to understand the electrical conductivity of metals and superconductivity. (PO-1, PO-2, PO-12)
4. Illustrate the application of quantum computing for computational aspects like design and data analysis. (PO-1, PO-2, PO-12)
5. Apply the concepts of statistical Physics for computing and understand the Physics of Animation. (PO-1, PO-2, PO-12)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Assignment/Mini Project	10	CO1, CO2, CO3, CO4, CO5
Quiz/Presentations	10	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

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## COMMUNICATIVE ENGLISH

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**Course Code:** HSCP15/25

**Credits:** 1:0:0

**Pre – requisites:** Nil

**Contact Hours:** 14L+14P

**Course Coordinators:** Dr. Premila Swamy D & Dr. Udayakumar H M

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### Course Content

#### Unit I

##### Fundamentals of Communication

Introduction and fundamentals of Communication, Process of communication, Barriers to effective communication, Different types of communication, Interpersonal and Intrapersonal communication skills, 7C's of communication.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill English Language Software – Body Language, Verbal & Nonverbal Communication.
- Links: Communication skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit II

##### Introduction to Phonetics

Introduction to Phonetics, English Pronunciation, Introduction to consonants, vowels, Syllables and structure, Word stress and Intonation in English language.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach.
- Lab component: English Language Lab – Lanquill English Language Software – Phonetics, Speaking & Listening activities.
- Links: Listening & Speaking Skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit III

##### Basic English Grammar and Vocabulary: Part I

Parts of Speech, Articles and Preposition, Question Tags, Idioms and Phrases, Vocabulary-Synonyms, Antonyms, Homonyms, Homophones, and Homographs.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component: English Language Lab – Lanquill English Language Software – Grammar Exercises
- Links: Grammar: <https://academicguides.waldenu.edu/writingcenter/grammar/subjectverbagreement>[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)



## Unit IV

### Basic English Grammar and Vocabulary: Part II

Word formation- Prefixes and Suffixes, Compound words, Contractions and Abbreviations, Tenses and Types of tenses, Rules in tense usage and Exercises on it.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Vocabulary, Reading & Writing Exercises.

## Unit V

### Communication Skills for Employment

Information Transfer: Oral Presentation and its Practice, Guidelines for Extempore/ Public Speaking, Mother Tongue Influence (MTI), Various Techniques for neutralization of Mother Tongue influence, Reading and Listening Comprehensions-Exercises

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: Technical Writing: English Language Lab – Lanquill English Language Software – Reading & Listening Exercises.
- Links: Resume: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

### Course Outcomes (COs):

on successful completion of the course students will be able to

1. Understand and apply the fundamentals of communication in English. (PO 9, PO10, PO12)
2. Identify the nuances of phonetics, intonation and enhance English pronunciation. (PO10, PO12)
3. Use correct grammar and vocabulary in everyday communication. (PO10, PO12)
4. Apply correct grammar, vocabulary and enhance communicative competency. (PO9, PO10, PO12)
5. Apply the techniques of information transfer through presentation. (PO9, PO10, PO12)

### Text Books:

1. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press India Pvt Ltd- 2019.
2. Meenakshi Raman & Sangeetha Sharma - Technical communication – Principles and Practice Oxford University Press – 2007.
3. A.J. Thomson & A. V. Martinet, A Practical English Grammar, Oxford University Press –1987.

## Reference Books:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education (India) Private Limited-2005.
2. Dr. Premila D Swamy & Udayakumar.H M, Communication skills for Engineers, Archers and Elevators Publishing House Bangalore, India, 2021.
3. S K. Khandelwal & R K Gupta, Functional Grammar & Composition, Laxmi Publication (P) Ltd.
4. N. Krishna Murthy, Modern English Grammar, Trinity press, 2016.
5. John Seely - The Oxford Guide to Effective Writing and Speaking. OUP, 2005.
6. Oxford Advanced Learners's Dictionary, 8th edition, 2013.
7. Martin Hewings - Advanced Grammar in Use, Cambridge University Press, 2013.

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30 (6 marks objective & 24 marks subjective pattern)	CO1, CO2, CO3
Internal Test-II	30 (6 marks objective & 24 marks subjective pattern)	CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other components</b>		
Assignment-I	10	CO1, CO2, CO3
Assignment-II	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 (10 marks objective & 40 marks subjective pattern)	CO1, CO2, CO3, CO4, CO5

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## KANNADA KALI

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Course Code: HSCP16/26K

Credits: 1:0:0

Pre-requisites: -

Contact Hours: 14L

Course Coordinator: Mrs. Kanya Kumari S

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### Course Content

#### Unit I

##### (Parichaya) - Introduction

Kannada Bhashe - About Kannada Language, Kannada – JnanpiTh Awardies  
Introduction to Kannada Language, Karnataka State and Literature .

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Unit II

**Kannada PadagaLu mattu VaakyagalU. Kannada Words and Sentences**  
naamapadagaLu – Sarva naamapadagaLu – (Nouns-Pronouns) and it's usage in  
Kannada

Kannada naamavisheshanagaLu - (Adjectives-Interrogatives)

kriyapadagaLu, kriya visheshaNagaLu- (verb-adverb)

Sambhashaneyalli Prashnarthaka padagalU –vaakyagaLu mattu kriyapadagaLu-  
visheshaNagaLu (Kannada- Interrogative words & Sentences and verb-adverb in  
Conversation)

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Unit III

##### **Kannada akshara maale(Kannada alphabets and their practices with pronunciations)**

swaraaksharagaLu –vyanjanaksharagaLu- gunitaksharagaLu, tantragnana mattu  
AaDalita padagaLu-Technical and administrative worlds in Kannada

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation

#### Unit IV

##### **Kannada padagaLu (eakavachana,bahuvachanagaLu,viruddha padagaLu dina nityadalli baLasuva padagaLu mattu sankya vyavaste**

Sambhashaneyalli Eakavachana mattu Bhahuvachana- (Singular and Plural nouns)  
Viruddha padagalU /Virodathaka padagalU (Antonyms) Asamanjasa Uchcharane  
(Inappropriate Pronunciation)

Sankhya Vyavasthe(Numbers system) -Samaya /Kalakke Sambhandhisida padhagalU  
(Words Relating to time) – Dikkugalige sambhadhisida padhagalU (Words Relating to  
Directions)

Aaharakke sambandisida padagaLu(Names connected with food)  
Manavana shareerada bhagagalu / angagalu (Parts of the Human body) Manava Sambhandhada da padhagalu (Terms Relating to Human Relationship)  
Manavana Bhavanegalige sambandisida Padagalu (Words Relating to Human's feelings and Emotions)  
Vaasada staLakke sambhandisidanthaha padhagalu (Words Relating to place of leaving)

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations

## Unit V

### **Kannada Bhasheyalli Sambhashanegalu- Conversations in Kannada**

Samanya Sambhashaneyalli Kannadada Padagalu mattu Vaakyagalu.  
(Kannada Words and Sentences in General Conversation with activities)  
(Conversation in Shop, Hostel, Market, Bus and Train)  
Shabdakosha: Vocabulary – chaTuvaTike: Exercises  
Vicharaneya / Bedikeya vakyagalu(Enquiry /Request sentences in Conversation)  
Shabdakosha – Vocabulary - Exercises to test their knowledge of understanding the Language.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations

### **Text Book:**

1. Dr.L.Thimmesh., Prof. Keshava muurthy, 'BaLake kannada' prasarangaa, VTU,2020

### **Reference Books:**

1. **Smt. KanyaKumari.S** –'Kannada Kali ' Kinnari publications' First edition, Bengaluru,2022
2. **Lingadevaru Halemane** – 'Kannada Kali', Prasaranga kannada University Hampi, 6<sup>th</sup> Edition. 2019

### **Course Outcomes (COs):**

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

1. Develop vocabulary (PO-10)
2. Identify the basic Kannada language skill(PO-10)
3. Develop listing & speaking skill in Kannada language. (PO-6, PO-12)
4. Enrich language skill. (PO-12)
5. Apply Kannada language skill for various purpose(PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

## ಕನ್ನಡ ಮನಸು

Course Code: HSCP16/26M

Credits: 1:0:0

Pre-requisites: -

Contact Hours: 14L

Course Coordinator: Mrs. Kanya Kumari S

### ಘಟಕ 1 (Unit I)

#### ಲೇಖನಗಳು (Articles) – ಕಾವ್ಯಭಾಗ (poetry)

ಕನ್ನಡ ಭಾಷೆ ನಾಡು – ನುಡಿ

ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ

ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ

ವಚನಗಳು-ಅಕ್ಕಮಹಾದೇವಿ-ಬಸವಣ್ಣ-ಅಲ್ಲಮಪ್ರಭು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 2 (Unit II)

#### ಕೀರ್ತನೆ ಮತ್ತು ತತ್ವ ಪದಗಳು

ಪುರಂದರ ದಾಸರು

ಶಿಶುನಾಳ ಶರೀಫರು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 3 (Unit III)

#### ಆಧುನಿಕ ಕಾವ್ಯಗಳು

ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ

ಕುರುಡು ಕಾಂಚಾಣ

ಚೋಮನ ಮಕ್ಕಳ ಹಾಡು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 4 (Unit IV)

#### ತಾಂತ್ರಿಕ ಧುರೀಣರು( ವ್ಯಕ್ತಿ ಪರಿಚಯ) ಕಥೆ-ಪ್ರವಾಸ ಕಥನ

ಡಾ.ಸರ್.ಎಂ.ವಿಶ್ವೇಶ್ವರಯ - ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ.ಎನ್.ಮೂರ್ತಿರಾಯರು

ಯುಗಾದಿ - ವಸುಧೇಂದ್ರ

ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ - ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 5 (Unit V)

ಕರಕುಶಲ ಕಲೆಗಳು ತಾಂತ್ರಿಕ ವಿಜ್ಞಾನ (technical science )

ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆ ವಿಜ್ಞಾನ- ಕರಿಗೌಡ ಬೇಟನ ಹಳ್ಳಿ

ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ-

ಕ ಮತ್ತು ಬ ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕಂಪ್ಯೂಟರ್ ಮುಖಾಂತರ ಕನ್ನಡ ಟೈಪಿಂಗ್ ತಾಂತ್ರಿಕ ಪದಕೋಶ ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

## ಪಠ್ಯ ಪುಸ್ತಕ (Text book):

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ'

ಸಂಪಾದಕರು:

ಡಾ.ಹಿ.ಜಿ, ಬೋರಲಿಂಗಯ್ಯ -ವಿಶ್ರಾಂತ ಕುಲಪತಿಗಳು, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ ,ಹಂಪಿ,ಪ್ರಸಾರಂಗ

ವಿಶ್ವೇಶ್ವರಯ್ಯತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ,ಬೆಳಗಾವಿ,ಪ್ರಥಮ ಮುದ್ರಣ-2020

ಪೂರಕ ಪಠ್ಯ (reference book) ಕನ್ನಡ ಮನಸು, ಪ್ರಸಾರಂಗ - ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ-ಹಂಪಿ, ಆರನೇಮುದ್ರಣ 2016

## ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡದ ಜೊತೆಗೆ ಕ್ರಿಯಾತ್ಮಕ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಡು-ನುಡಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು (PO-6)
- ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣ, ಭಾಷಾರಚನೆ ಯ ನಿಯಮಗಳನ್ನು ಪರಿಚಯಿಸುವುದು (PO-10)
- ಕನ್ನಡ ಭಾಷಾಬರಹದಲ್ಲಿ ಕಂಡು ಬರುವ ದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ (PO-10)
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು , ಸರ್ಕಾರಿ ಹಾಗೂ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು (PO-12)
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. (PO-12)

## Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	Marks	Course outcomes attained
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
Other components		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

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## A SCIENTIFIC APPROACH TO HEALTH

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Course Code: AECPI7/27

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L

Course Coordinator: Dr. Anita Kanavalli

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### Course Content

#### Unit I

##### **Good Health and its balance for positive mindset (2 lecture hours)**

Health- its importance, factors, beliefs and behaviour, Good health benefits, Health and Society, Health and family, Health and Personality, Health and behaviour, Disparities of health in different vulnerable groups. Health and psychology, Methods to improve good psychological health. Psychological disorders (Stress and Health – Stress management), Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation
- Link for YouTube videos: [https://www.youtube.com/watch?v=71\\_NkXgAK1g](https://www.youtube.com/watch?v=71_NkXgAK1g)  
Animation videos: <https://www.youtube.com/watch?v=mwuahwbIBnE>

#### Unit II

##### **Building of healthy lifestyles for better future (3 lecture hours)**

Role of diet for good health, Food and health, Nutritional guidelines for good health and wellbeingness, Obesity and overweight disorders and its management, Eating disorders-proper exercises for its maintenance (Physical activities or health),Fitness components for health, Wellness and physical function.

- Pedagogy/Course delivery tools: Chalk and Talk
- Link for YouTube videos: <https://www.youtube.com/watch?v=c06dTj0v0sM>  
Animation videos: <https://www.youtube.com/watch?v=Y8HIFRPU6pM>

#### Unit III

##### **Creation of Healthy and caring relationships (3 lecture hours)**

Building communication skills (Listening and speaking), Friends and friendship - education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life(more than a biology),Changing health behaviours through social engineering.

- Pedagogy/Course delivery tools: Chalk and Talk
- Link for YouTube videos: <https://www.youtube.com/watch?v=IwZIFG-3Y4o>  
Animation videos: <https://www.youtube.com/watch?v=rzEI6ZVmGW8>

#### Unit IV

##### **Avoiding risks and harmful habits (3 lecture hours)**

Characteristics of health compromising behaviors, addictions -recognizing and



avoiding, addictive behaviors, Types of addictions, influencing factors for addictions, Differences between addictive people and non addictive people and their behavior with society, Effects and health hazards from addictions.

- Pedagogy/Course delivery tools: Chalk and Talk
- Link for YouTube videos: [https://www.youtube.com/watch?v=S-12Zj\\_JIRQ](https://www.youtube.com/watch?v=S-12Zj_JIRQ)  
Animation videos: <https://www.youtube.com/watch?v=OnFVfFAImEg>

## Unit V

### Preventing and fighting against diseases for good health (3 lecture hours)

Occurrence of infections and reasons, protection from different types of transmitted infections, Current trends of socioeconomic impact, Reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life, Health and Wellness of youth, Measuring of health and wealth status.

- Pedagogy/Course delivery tools: Chalk and Talk
- Link for YouTube videos: <https://www.youtube.com/watch?v=X0OxrsgAP2w>  
Animation videos: <https://www.youtube.com/watch?v=Ap1FXfy91d4>

### Text Books:

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor –Published by Routledge 711Third Avenue, NewYork, NY10017.
2. **Health Psychology A Textbook**, (Fourth Edition) by Jane Ogden McGraw-Hill Education (India) Private Limited- Open University Press

### Reference Books:

1. Health Psychology (Ninth Edition) by SHELLEYE. TAYLOR-University of California, Los Angeles , McGraw-Hill Education(India)Private Limited- Open University Press
2. Scientific Foundations of Health (Health & Wellness)- General Books published for university and colleges references by popular authors and published by the reputed publisher.

### Video Lectures:

SWAYAM/NPTL/MOOCs/Weblinks/InternetsourcesYouTubevideosandothermaterials/notes.

### Course Outcomes (COs):

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

1. Demonstrate the skills to live a healthy life and be a part of a healthy community. (PO-6, PO-7)
2. Learn how to use their stream of study towards sustainable living. (PO-7, PO-8)
3. Demonstrate the knowledge as a gateway for exchange of innovative thinking contributing to healthy individual and community. (PO-8, PO-9)

4. Learn to cultivate psycho-social behavioral quality. (PO-9, PO-10)
5. Understand the importance of science and scientific applications to enhance health. (PO-10, PO-12)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
MCQ /Casestudy/group activity with report writing	20	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
90 minutes (02 Hours duration).	50	CO1, CO2, CO3, CO4, CO5

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# PRINCIPLES OF PROGRAMMING USING C

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Course Code: PPC18

Credits: 2:0:1

Pre-requisites: -

Contact Hours: 28L+14P

Course Coordinator: Dr. Ganeshayya Shidaganti

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## Course Content

### Unit I

**Introduction to computers:** Computer Systems, Computing Environment, Computer Languages, Creating and Running Programs, System Development. **Introduction to C programming:** Background, Structure of C Program, Identifiers, Data Types, Variables, Constants, Input/ Output. Formatting Input/Output. Library Functions, Single Character Input –The getchar() , Single Character Output-The putchar(),

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Links: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods

### Unit II

**Operators and Expressions:** Arithmetic operators, Unary operators, Relational and Logical Operators, Assignment Operators, Conditional Operators. Expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion. **Selection - Making Decision:** Two Way Selection, Multiway Selection, **Repetition:** Concepts of a loop, Pretest and Post-test Loops, Initialization and Updating, Loops in C: The while loop, the do. while loop, The for loop, The break and continue statement, the goto statement.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Links: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods

### Unit III

**Arrays:** Concepts, Using arrays in C: Declaration and Definition, Accessing Elements in Array, Storing Values in Arrays, Processing an array, Sorting and Searching. Two Dimensional Arrays, Multidimensional Arrays. **Functions in C:** A brief Overview, Defining a Function, User Defined Functions, Function Prototypes, Passing Arguments to a Function, Scope-global and local; Recursion.

- Pedagogy/Course delivery tools: Chalk and talk, power point presentation, videos
- Links: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods

### Unit IV

**Storage Classes:** automatic variables, external (global) variables, static variables  
**Strings:** String Concepts, Defining a String, Declaring Strings, Initializing String,

Arrays of Strings, String Manipulations Functions **Pointers:** Pointer Concepts, Pointer Declaration and Definition, Initialization of Pointer Variables, Passing Pointers to a Function, Pointers and Array, Pointers and Character Array.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Links: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods

## Unit V

**Derived Types:** Enumerated Types: Declaring an Enumerated Type, Operations on Enumerated Types, Initializing Enumerated Constants. **Structures and Unions:** Structure Type Declaration, Initialization, Accessing Structures, Structures Containing Arrays, Array of Structures. Unions and Structures. **File Handling:** Using Binary Files, Reading and Writing a Data File.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Links: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem solving methods

### Course Outcomes (COs):

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

1. Identify the basic elements of Computing Systems and C Programming Constructs.
2. Demonstrate the use of Operators & Expressions, Decision Making and Looping Statements.
3. Explore Arrays and User-Defined Functions in Implementing Solutions to Real world Problems
4. Illustrate the usage of Storage Classes, Strings and Pointers in Problem Solving.
5. Demonstrate the use of Modular Programming Constructs involving Files, Structure & Unions.

### Lab Component:

Sl. No	QUESTIONS
1.	<p><b>Creating and Running Simple C Programs:</b></p> <ul style="list-style-type: none"> <li>• C-Program to calculate the sum of three numbers / C-Program to demonstrate a Simple Calculator.</li> <li>• C-Program to calculate the area and circumference of a circle using PI as a defined constant.</li> <li>• C-Program to convert temperature given in Celsius to Fahrenheit and Fahrenheit to Celsius</li> <li>• C-Program to compute the roots of a quadratic equation by accepting the coefficients.</li> </ul>

2.	<p><b>Creating and Running C Programs on Expressions :</b></p> <ul style="list-style-type: none"> <li>• C-Program to calculate quotient and remainder of two numbers. (Page: 125)</li> <li>• C-Program to evaluate two complex expressions. (Page:113)</li> <li>• C-Program to demonstrate automatic and type casting of numeric types(Page: 117 and 119)</li> <li>• C-Program to calculate the total sales given the unit price, quantity, discount and tax rate(Page: 130)</li> <li>• C-Program to calculate a student's average score for a course with 4 quizzes, 2 midterms and a final. The quizzes are weighted 30%, the midterms 40% and the final 30%. (Page: 131)</li> </ul>
3.	<p><b>Creating and Running C Programs on Making Decision:</b></p> <ul style="list-style-type: none"> <li>• C-Program to determine the use of the character classification functions found in c-type library. (Page:267)</li> <li>• C-Program to read a test score, calculate the grade for the score and print the grade. (Page: 259)</li> <li>• C-Program to uses a menu to allow the user to add, multiply, subtract and divide two numbers using switch case. (Page: 277)</li> <li>• C-Program to read the name of the user, number of units consumed and print out the charges. An electricity board charges the following rates for the use of electricity: <ul style="list-style-type: none"> <li>o For the first 200 units 80 paise per unit</li> <li>o For the next 100 units 90 paise per unit</li> <li>o Beyond 300 units Rs 1 per unit.</li> </ul> <p>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.</p> </li> </ul>
4.	<p><b>Creating and Running C Programs on Repetition or Loops:</b></p> <ul style="list-style-type: none"> <li>• C-Program to print a number series from 1 to a user-specified limit in the form of a right triangle (Page: 328)</li> <li>• C-Program to print the number and sum of digits in an integer. (Page:332)</li> <li>• C-Program to calculate the factorial of a number using for loop/ Recursion(Page:351)</li> <li>• C-Program to calculate nth Fibonacci number. (Page:355)</li> <li>• C-Program to convert binary to a decimal number (Page: 335)</li> </ul>
5.	<p><b>Creating and Running C Programs on One Dimensional Arrays:</b></p> <ul style="list-style-type: none"> <li>• C-Program to print square of index and print it. (Page:471)</li> <li>• C-Program to calculate average of the number in an array. (Page:477)</li> <li>• C-Program to sort the list using bubble sort. (Page:495)</li> <li>• C-Program to search an ordered list using binary search. (Page:508)</li> </ul>
6.	<p><b>Creating and Running C Programs on Two Dimensional Arrays:</b></p> <ul style="list-style-type: none"> <li>• C-Program to perform addition of two matrices.</li> <li>• C-Program to perform multiplication of two matrices.</li> <li>• C-Program to find transpose of the given matrices.</li> <li>• C-Program to find row sum and column sum and sum of all elements in a matrix.</li> <li>• C-Program initialize/fill all the diagonal elements of a matrix with zero and print.</li> </ul>

7.	<p><b>Creating and Running C Programs on User Defined Functions:</b></p> <ul style="list-style-type: none"> <li>• C-program to read a number, Find its factorial using function with argument and with return type.</li> <li>• C-Program to read two number, Find its GCD and LCM using function with arguments and without return type.</li> <li>• C-Program to read a number, Find whether it is a palindrome or not using function without argument and with return type.</li> <li>• C-Program to read a number, Find whether it is prime number or not using function without arguments and without return type.</li> </ul>
8.	<p><b>Creating and Running C Programs on Strings:</b></p> <ul style="list-style-type: none"> <li>• C-program read two strings, Combine them without using string built-in functions.</li> <li>• C-program read two strings, Compare them without using string built-in functions.</li> <li>• C-program read two strings, concatenate them without using string built-in functions.</li> <li>• C Program to Check if the Substring is Present in the Given String.</li> <li>• C-program to demonstrate built-in sting functions like strlen(), strcpy(), strcmp(), strcat().</li> </ul>
9.	<p><b>Creating and Running C Programs on Storage Classes and Pointers:</b></p> <ul style="list-style-type: none"> <li>• C-program to show the use of auto and static variable. (Page:1108)</li> <li>• C-program to add two numbers using pointers. / C-program to swap two numbers using pointers.</li> <li>• C-program to show how the same pointer can point to different data variable. (Page:571)/ C-program to show the use of different pointers point to the same variable (Page:572)</li> <li>• C-Program to read an array of elements, Compute its sum using pointers.</li> </ul>
10.	<p><b>Creating and Running C Programs on Derived Types and and Unions:</b></p> <ul style="list-style-type: none"> <li>• C-Program to print selected TV stations for our cable TV systems. (Page: 751)</li> <li>• C-Program to demonstrate union of short int and two char (Page:783)</li> </ul>
11.	<p><b>Creating and Running C Programs on Structures:</b></p> <ul style="list-style-type: none"> <li>• C Program to read employee details (name, salary, address) and print the same using structure.</li> <li>• C-Program to read marks of three students in 3 subjects. Calculate the total marks scored, student wise and subject wise using structure.</li> </ul>
12.	<p><b>Creating and Running C Programs on Files:</b></p> <ul style="list-style-type: none"> <li>• C-Program to demonstrate function fread()/fscanf()</li> <li>• C-Program to demonstrate function fwrite()/fprintf()</li> </ul>

### Text Book:

1. Behrouz A. Forouzan, Richard F. Gilberg, Computer science a structured programming approach using C, Third Edition, Cengage Learning, and ISBN: 9788131503638, 8131503631, and 2007.

### Reference Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Computer fundamentals and programming in c, “Reema Thareja”, Oxford University, Second edition, 2017.
3. Brian W. Kernighan and Dennis M. Ritchie, The ‘C’ Programming Language, Prentice Hall of India.

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Lab Component Evaluation	20	CO1, CO2, CO3, CO4, CO5
<b>Semester-End Examination (SEE)</b>	100	CO1, CO2, CO3, CO4, CO5

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## ENGINEERING PHYSICS LABORATORY

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**Course Code: PYLC19**

**Credits: 0:0:1**

**Pre-requisites: Nil**

**Contact Hours: 14P**

**Course Coordinator: Dr. Nagesh B V**

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### Course Contents

1. General Instructions and Introduction to Error Analysis.
  2. Plotting of forward and reverse bias characteristics of a Zener Diode and determination of breakdown voltage.
  3. Determination of numerical aperture, Acceptance angle and bending loss in Optical Fibre Cable.
  4. Measurement of capacitance and dielectric constant of a capacitor by charging and discharging it through a resistor.
  5. Calculation of Planck's constant using LEDs.
  6. Verification of Stefan's law
  7. Identification of different components (L,C or R) of a Black Box and calculation of their values through frequency response curves.
  8. Determination of Moment of inertia of an irregular body and rigidity modulus of the material of the suspension wire using torsional oscillations.
  9. Determination of Young's Modulus of the material of the single cantilever beam.
  10. Determination of Energy gap of semiconductor.
  11. Determination of Fermi energy of a metal.
  12. Measurement of operating wavelength of semiconductor laser using Laser diffraction.
  13. Calculation of thickness of given paper strip by the method of interference fringes (Air wedge).
  14. Frequency response of series and parallel LCR circuits and calculation of Q-factor and band width.
  15. Determination of Hall coefficient and concentration of charge carriers of the semiconductor.
  16. Simulation of electrical experiments using Pspice
- Students are required to perform 12 prescribed experiments (from 2 to 16) in the above list. Cyclic order will be followed.

### Reference Books:

1. Laboratory manual prepared by the Physics department, RIT, Bangalore



### Suggested Learning e-Resources (Web links and Video Lectures)

1. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
2. <https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html>
3. [https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)
4. <https://phet.colorado.edu>
5. <https://www.myphysicslab.com>

### Course Outcomes (COs):

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

1. Determine elastic constants of material using torsion pendulum and cantilever. (PO-1, PO-4)
2. Apply the concepts of interference and diffraction of light to determine thickness of thin films and wavelength of light. (PO-1, PO-4)
3. Construct and analyze simple AC and DC circuits to determine electrical parameters, familiarity with the concepts of modern Physics. (PO-1, PO-4, PO-5)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Weekly evaluation of laboratory journals/ reports after the conduction of every experiment.	30	CO1, CO2, CO3
Practical test	20	CO1, CO2, CO3
<b>Semester End Examination (SEE)</b>	50	CO1, CO2, CO3

# **CIVIL ENGINEERING STREAM I SEMESTER**

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## ADVANCED CALCULUS

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Course Code: MAV11

Credits: : 2:1:1

Pre-requisites: -

Contact Hours: 28L+14T+14P

Course Coordinator: Dr. M V Govindaraju

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### Course Contents

#### Unit I

**Differential Calculus-I:** Polar curves, Angle between the radius vector and the tangent, Angle between the curves, Length of perpendicular from pole to the tangent, Pedal equations. Derivative of arc length & Radius of Curvature in Cartesian, polar & parametric forms.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

#### Unit II

**Partial Differentiation:** Partial derivatives, Total differential coefficient, Differentiation of composite and implicit functions, Euler's theorem. Jacobians and properties.

**Vector differentiation:** Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence of a vector field, Solenoidal vector, Curl of a vector field, Irrotational vector, Laplacian operator. Physical interpretation of Gradient, Divergence and Curl.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

#### Unit III

**Reduction formula:** Reduction formulae for  $\sin^n x$ ,  $\cos^n x$ ,  $\sin^m x$ ,  $\cos^n x$ .

**Multiple integrals:** Evaluation of double and triple integrals, Change of order of integration, Change of variables. Applications of double and triple integrals to find areas and volumes.

- Pedagogy/Course delivery tools: Chalk and talk, power point presentation, videos
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

#### Unit IV

**Vector Integration:** Line integrals, surface integrals and volume integrals. Green's theorem (with proof), Stokes' theorem and Gauss divergence theorem (without proofs). Calculation of work done, finding flux over a surface, computation of volume of a curved surface.

- Pedagogy / Course delivery tools: Chalk and talk, Videos
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

## Unit V

**Linear Algebra:** Elementary transformations on a matrix, Echelon form & rank of a matrix, Consistency of system of linear equations. Gauss elimination & Gauss – Seidel method to solve system of linear equations. Applications to solve traffic flow problems and electric circuit problems. Eigenvalues and eigenvectors of a matrix, Rayleigh power method to determine the dominant eigenvalue of a matrix, diagonalization of square matrices. Solution of system of ODEs by matrix method.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/108/111108066/>  
<https://nptel.ac.in/courses/111/105/111105035/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/619570/1030>

### Text Books:

1. **George B. Thomas, Maurice D. Weir, Joel R. Hass** - Thomas' Calculus, Pearson, 13<sup>th</sup> edition, 2014.
2. **B. S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 4<sup>th</sup> edition, 2017

### Reference Books:

1. **Erwin Kreyszig** - Advanced Engineering Mathematics, Wiley publication, 10<sup>th</sup> edition, 2015.
2. **Srimanta Pal & Subodh C Bhunia** - Engineering Mathematics, Oxford University Press, 3<sup>rd</sup> Reprint, 2016.
3. **B. V. Ramana** - Higher Engineering Mathematics, Tata McGraw-Hill, 11<sup>th</sup> Edition, 2010.
4. **David C Lay** - Linear Algebra and its Applications, Pearson Publishers, 4<sup>th</sup> Ed., 2018.

### Course Outcomes (COs):

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

1. Solve problems related to Polar curves, Radius of curvature. (PO-1, PO-2)
2. Apply vector differentiation to identify solenoidal and irrotational vectors and solve the problems related to Partial derivatives. (PO-1, PO-2)
3. Evaluate multiple integrals and use them to find areas and volumes. (PO-1, PO-2)
4. Exhibit the interdependence of line, surface and volume integrals using integral theorems. (PO-1, PO-2)
5. Solve system of linear equations and ordinary differential equations using matrices. (PO-1, PO-2)

## List of Laboratory experiments:

1. Introduction to MATLAB(Creating MATLAB variables, Elementary mathematical operations, Plotting and customization of graphs, Control statements, m-file)
2. Plotting Polar curves, Calculating length of perpendicular from pole to the tangent for a polar curve, derivative of arc length of a given curve
3. Finding radius of curvatures for given curve in cartesian and polar form, finding Jacobian to transform from one coordinate system to another coordinate system
4. Finding Gradient, Divergence and Curl and plotting scalar field, vector field
5. Computation of derivative and single integral. Plotting regions using boundary conditions. Computing arc length of a curve, area, surface area of revolution using single integration
6. Finding area and volume using double and triple integral
7. Finding line integrals and verifying Green's theorem
8. Evaluating surface and volume integrals for a given vector point function
9. Solution of system of linear equations using Gauss elimination, Gauss – Seidel method
10. Solution of system of ODE using Eigen values and Eigen vectors

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two tests shall be taken		
<b>Lab components</b>		
Conducting Experiment and Laboratory Record	15	CO1, CO2, CO3, CO4, CO5
Lab Test	05	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer any one question from each unit – Internal choice)	100	CO1, CO2, CO3, CO4, CO5

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## ENGINEERING PHYSICS

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Course Code: PYV12

Credits: 2:1:0

Pre-requisites: Nil

Contact Hours: 28L+14T

Course Coordinator: Dr. Vaijyanthimala

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### Course Content

#### Unit I

##### Photonics

**Lasers:** Characteristics of LASER, Interaction of radiation with matter, Expression for energy density equation and its significance, Requisites of a Laser system, Conditions for Laser action, Principle, Construction and working of He-Ne laser, Semiconductor Laser, Application of Lasers – LIDAR, Bridge deflection and Laser Printing, Numerical problems.

**Optical Fibers:** Review of principle and Propagation mechanism in Fibers & TIR, Angle of acceptance, Numerical aperture, fractional index change, Modes of propagation, Number of modes and V parameter, Types of optical fibers, Attenuation and Mention of expression for attenuation coefficient, Applications: Point to point communication discussion with block diagram, Merits and demerits, Numerical problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=YHmGNDMV1cY>

#### Unit II

##### Elasticity

Elastic Moduli, Poisson's ratio and its limiting values. Stress hardening and softening, Derivations for Y, K, n in terms of linear and lateral strains, Relationship between Y, k, n and  $\sigma$ . Beams, Bending moment of a beam, Torsion of a cylinder and determination of couple per unit twist. Torsion pendulum—Determination of rigidity modulus using torsion pendulum, Expression for Cantilever loaded at free end. I-section girder and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - ductile fracture, brittle fracture, stress concentration, fatigue and factors affecting fatigue (only qualitative explanation) Numerical problems

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=h1tffE-L2Dc&list=RDCMUCEik-U3T6u6JA0X-iHLbNbOw&index=10>

#### Unit III

##### Oscillations and Shock Waves

**Oscillations:** Simple Harmonic motion (SHM), differential equation for SHM (No derivation), Springs: Stiffness Factor and its Physical Significance, series and parallel combination of springs(Derivation), Types of springs and their applications. Theory

of damped oscillations: under, over and critical damping. Engineering applications of damped oscillations. Theory of forced oscillations, resonance, sharpness of resonance. **Shock waves:** Mach number and Mach Angle, Mach Regimes, definition and characteristics of Shock waves, Construction and working of Reddy shock tube, Applications of Shock Waves. Numerical problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: [https://www.youtube.com/watch?v=tz\\_3M3v3kxk](https://www.youtube.com/watch?v=tz_3M3v3kxk)

## Unit IV

### Acoustics, Radiometry and Photometry

**Acoustics:** Introduction to acoustics, Types of Acoustics, reverberation and reverberation time, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its Measurements, Sound Insulation and its measurements. Impact of Noise in Multi-storied buildings, Numerical Problems

**Radiometry and Photometry:** Radiation quantities, Spectral Quantities, Relation between luminescence and radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law).

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=fHBPvMDFyO8>

## Unit V

### Natural Hazards and Safety

Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Landslide (causes such as excess rain fall, geological structure, human excavation etc, types of land slide, adverse effects, engineering solution for landslides). Fire hazards and fire protection, fire-proofing materials, fire safety regulations and firefighting equipment - Prevention and safety measures.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: [https://www.youtube.com/watch?v=kj1kaA\\_8Fu4](https://www.youtube.com/watch?v=kj1kaA_8Fu4)

### Text Books:

1. **Gaur and Gupta** - A Textbook of Engineering Physics, Dhanpat Rai Publishers, New Delhi, 8th revised edition 2015.
2. **M.N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy:** A text book of Engineering Physics, S Chand and Company Ltd. New Delhi 11th edition.
3. **M. R. Srinivasan** – Physics for engineers, New Age International Publishers, New Delhi, 2nd edition.

## Reference Books:

1. **Resnick, Halliday and Jearl Walker** - Fundamentals of Physics, John Wiley & Sons, Inc., 11<sup>th</sup> edition, 2018.
2. **Chintoo S Kumar, K Takayama and K P J Reddy** - Shock waves made simple, Willey India Pvt. Ltd, New Delhi 2014
3. **Micheal Bukshab** - Photometry Radiometry and Measurements of Optical Losses, Springer, 2<sup>nd</sup> edition.
4. **Ramesh P Singh and Darius Bartlett:** Natural hazards, Earthquakes, Volcanoes, and landslides, CRC Press, Taylor and Francis

## Course Outcomes (COs):

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

1. Enumerate the principles of Photonic devices and their application relevant to civil engineering. (PO-1, PO-2, PO-12)
2. Elucidate the concepts of elasticity, relation between different elastic moduli and materials failure. (PO-1, PO-2, PO-12)
3. Distinguish between different types of oscillations, Resonance and its Engineering Applications. (PO-1, PO-2, PO-12)
4. Apply the concepts of acoustics in buildings and analyse radiation and photometry parameters. (PO-1, PO-2, PO-12)
5. Summarize various natural hazards and safety precautions. (PO-1, PO-2, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Assignment/Mini Project	10	CO1, CO2, CO3, CO4, CO5
Quiz/Presentations	10	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5



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## COMMUNICATIVE ENGLISH

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**Course Code: HSCP15/25**

**Credits: 1:0:0**

**Pre – requisites: Nil**

**Contact Hours: 14L+14P**

**Course Coordinators: Dr. Premila Swamy D & Dr. Udayakumar H M**

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### Course Content

#### Unit I

##### Fundamentals of Communication

Introduction and fundamentals of Communication, Process of communication, Barriers to effective communication, Different types of communication, Interpersonal and Intrapersonal communication skills, 7C's of communication.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill English Language Software – Body Language, Verbal & Nonverbal Communication.
- Links: Communication skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit II

##### Introduction to Phonetics

Introduction to Phonetics, English Pronunciation, Introduction to consonants, vowels, Syllables and structure, Word stress and Intonation in English language.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach.
- Lab component: English Language Lab – Lanquill English Language Software – Phonetics, Speaking & Listening activities.
- Links: Listening & Speaking Skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit III

##### Basic English Grammar and Vocabulary: Part I

Parts of Speech, Articles and Preposition, Question Tags, Idioms and Phrases, Vocabulary-Synonyms, Antonyms, Homonyms, Homophones, and Homographs.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component: English Language Lab – Lanquill English Language Software – Grammar Exercises
- Links: Grammar: <https://academicguides.waldenu.edu/writingcenter/grammar/subjectverbagreement> [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

## Unit IV

### Basic English Grammar and Vocabulary: Part II

Word formation- Prefixes and Suffixes, Compound words, Contractions and Abbreviations, Tenses and Types of tenses, Rules in tense usage and Exercises on it.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Vocabulary, Reading & Writing Exercises.

## Unit V

### Communication Skills for Employment

Information Transfer: Oral Presentation and its Practice, Guidelines for Extempore/ Public Speaking, Mother Tongue Influence (MTI), Various Techniques for neutralization of Mother Tongue influence, Reading and Listening Comprehensions-Exercises

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: Technical Writing: English Language Lab – Lanquill English Language Software – Reading & Listening Exercises.
- Links: Resume: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

### Course Outcomes (COs):

on successful completion of the course students will be able to

1. Understand and apply the fundamentals of communication in English. (PO-9, PO-10, PO-12)
2. Identify the nuances of phonetics, intonation and enhance English pronunciation. (PO-10, PO-12)
3. Use correct grammar and vocabulary in everyday communication. (PO-10, PO-12)
4. Apply correct grammar, vocabulary and enhance communicative competency. (PO-9, PO-10, PO-12)
5. Apply the techniques of information transfer through presentation. (PO-9, PO-10, PO-12)

### Text Books:

1. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press India Pvt Ltd- 2019.
2. Meenakshi Raman & Sangeetha Sharma - Technical communication – Principles and Practice Oxford University Press – 2007.
3. A.J. Thomson & A. V. Martinet, A Practical English Grammar, Oxford University Press –1987.

## Reference Books:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education (India) Private Limited-2005.
2. Dr. Premila D Swamy & Udayakumar H M, Communication skills for Engineers, Archers and Elevators Publishing House Bangalore, India, 2021.
3. S K. Khandelwal & R K Gupta, Functional Grammar & Composition, Laxmi Publication (P) Ltd.
4. N. Krishna Murthy, Modern English Grammar, Trinity press, 2016.
5. John Seely - The Oxford Guide to Effective Writing and Speaking. OUP, 2005.
6. Oxford Advanced Learners's Dictionary, 8th edition, 2013.
7. Martin Hewings - Advanced Grammar in Use, Cambridge University Press, 2013.

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30 (6 marks objective & 24 marks subjective pattern)	CO1, CO2, CO3
Internal Test-II	30 (6 marks objective & 24 marks subjective pattern)	CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other components</b>		
Assignment-I	10	CO1, CO2, CO3
Assignment-II	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 (10 marks objective & 40 marks subjective pattern)	CO1, CO2, CO3, CO4, CO5

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## KANNADA KALI

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**Course Code: HSCP16/26K**

**Credits: 1:0:0**

**Pre-requisites: Nil**

**Contact Hours: 14L**

**Course Coordinator: Mrs. Kanya Kumari S**

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### Course Content

#### Unit I

##### (Parichaya) - Introduction

Kannada Bhashe - About Kannada Language, Kannada – JnanpiTh Awardies  
Introduction to Kannada Language, Karnataka State and Literature .

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Unit II

##### **Kannada PadagaLu mattu VaakyagalU. Kannada Words and Sentences**

naamapadagaLu – Sarva naamapadagaLu – (Nouns-Pronouns) and it's usage in  
Kannada

Kannada naamavisheshanagaLu - (Adjectives-Interrogatives)

kriyapadagaLu, kriya visheshaNagaLu- (verb-adverb)

Sambhashaneyalli Prashnarthaka padagalU –vaakyagaLu mattu kriyapadagaLu-  
visheshaNagaLu (Kannada- Interrogative words & Sentences and verb-adverb in  
Conversation)

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Unit III

##### **Kannada akshara maale(Kannada alphabets and their practices with pronunciations)**

swaraaksharagaLu –vyanjanaksharagaLu- gunitaksharagaLu, tantragnana mattu  
AaDalita padagaLu-Technical and administrative worlds in Kannada

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation

#### Unit IV

##### **Kannada padagaLu (eakavachana,bahuvachanagaLu,viruddha padagaLu dina nityadalli baLasuva padagaLu mattu sankya vyavaste**

Sambhashaneyalli Eakavachana mattu Bhahuvachana- (Singular and Plural nouns)  
Viruddha padagalU /Virodharthaka padagalU (Antonyms) Asamanjasa Uchcharane  
(Inappropriate Pronunciation)

Sankhya Vyavasthe(Numbers system) -Samaya /Kalakke Sambhandhisida padhagalU  
(Words Relating to time) – Dikkugalige sambhadhisida padhagalU (Words Relating to  
Directions)

Aaharakke sambandisida padagaLu(Names connected with food)  
Manavana shareerada bhagagalu / angagalu (Parts of the Human body) Manava Sambhandhada da padhagalu (Terms Relating to Human Relationship)  
Manavana Bhavanegalige sambandisida Padagalu (Words Relating to Human's feelings and Emotions)  
Vaasada staLakke sambhandisidanthaha padhagalu (Words Relating to place of leaving)

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations

## Unit V

### **Kannada Bhasheyalli Sambhashanegalu- Conversations in Kannada**

Samanya Sambhashaneyalli Kannadada Padagalu mattu Vaakyagalu.  
(Kannada Words and Sentences in General Conversation with activities)  
(Conversation in Shop, Hostel, Market, Bus and Train)  
Shabdakosha: Vocabulary – chaTuvaTike: Exercises  
Vicharaneya / Bedikeya vakyagalu(Enquiry /Request sentences in Conversation)  
Shabdakosha – Vocabulary - Exercises to test their knowledge of understanding the Language.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations

### **Text Book:**

1. Dr.L.Thimmesh., Prof. Keshava muurthy, 'BaLake kannada' prasarangaa, VTU,2020

### **Reference Books:**

1. **Smt. KanyaKumari.S** –'Kannada Kali ' Kinnari publications' First edition, Bengaluru,2022
2. **Lingadevaru Halemane** – 'Kannada Kali', Prasaranga kannada University Hampi, 6<sup>th</sup> Edition. 2019

### **Course Outcomes (COs):**

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

1. Develop vocabulary (PO-10)
2. Identify the basic Kannada language skill(PO-10)
3. Develop listing & speaking skill in Kannada language. (PO-6, PO-12)
4. Enrich language skill. (PO-12)
5. Apply Kannada language skill for various purpose (PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

## ಕನ್ನಡ ಮನಸು

Course Code: HSCP16/26M

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L

Course Coordinator: Mrs. Kanya Kumari S

### ಘಟಕ 1 (Unit I)

#### ಲೇಖನಗಳು (Articles) – ಕಾವ್ಯಭಾಗ (poetry)

ಕನ್ನಡ ಭಾಷೆ ನಾಡು – ನುಡಿ

ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ

ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ

ವಚನಗಳು-ಅಕ್ಕಮಹಾದೇವಿ-ಬಸವಣ್ಣ-ಅಲ್ಲಮಪ್ರಭು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 2 (Unit II)

#### ಕೀರ್ತನೆ ಮತ್ತು ತತ್ವ ಪದಗಳು

ಪುರಂದರ ದಾಸರು

ಶಿಶುನಾಳ ಶರೀಫರು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 3 (Unit III)

#### ಆಧುನಿಕ ಕಾವ್ಯಗಳು

ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ

ಕುರುಡು ಕಾಂಚಾಣ

ಚೋಮನ ಮಕ್ಕಳ ಹಾಡು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 4 (Unit IV)

#### ತಾಂತ್ರಿಕ ಧುರೀಣರು( ವ್ಯಕ್ತಿ ಪರಿಚಯ) ಕಥೆ-ಪ್ರವಾಸ ಕಥನ

ಡಾ.ಸರ್.ಎಂ.ವಿಶ್ವೇಶ್ವರಯ - ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ.ಎನ್.ಮೂರ್ತಿರಾಯರು

ಯುಗಾದಿ - ವಸುಧೇಂದ್ರ

ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ - ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 5 (Unit V)

ಕರಕುಶಲ ಕಲೆಗಳು ತಾಂತ್ರಿಕ ವಿಜ್ಞಾನ (technical science )

ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆ ವಿಜ್ಞಾನ- ಕರಿಗೌಡ ಬೇಚನ ಹಳ್ಳಿ

ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ-

ಕ ಮತ್ತು ಬ ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕಂಪ್ಯೂಟರ್ ಮುಖಾಂತರ ಕನ್ನಡ ಟೈಪಿಂಗ್ ತಾಂತ್ರಿಕ ಪದಕೋಶ ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

## ಪಠ್ಯ ಪುಸ್ತಕ (Text book):

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ'

ಸಂಪಾದಕರು:

ಡಾ.ಹಿ.ಜಿ, ಬೋರಲಿಂಗಯ್ಯ -ವಿಶ್ರಾಂತ ಕುಲಪತಿಗಳು, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ ,ಹಂಪಿ,ಪ್ರಸಾರಂಗ

ವಿಶ್ವೇಶ್ವರಯ್ಯತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ,ಬೆಳಗಾವಿ,ಪ್ರಥಮ ಮುದ್ರಣ-2020

ಪೂರಕ ಪಠ್ಯ (reference book) ಕನ್ನಡ ಮನಸು, ಪ್ರಸಾರಂಗ - ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ-ಹಂಪಿ, ಆರನೇಮುದ್ರಣ 2016

## ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡದ ಜೊತೆಗೆ ಕ್ರಿಯಾತ್ಮಕ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಡು-ನುಡಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು (PO6)
- ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣ, ಭಾಷಾರಚನೆ ಯ ನಿಯಮಗಳನ್ನು ಪರಿಚಯಿಸುವುದು (PO-10)
- ಕನ್ನಡ ಭಾಷಾಬರಹದಲ್ಲಿ ಕಂಡು ಬರುವ ದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ (PO-10)
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು , ಸರ್ಕಾರಿ ಹಾಗೂ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು (PO-12)
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. (PO-12)

## Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	Marks	Course outcomes attained
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
Other components		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5



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## A SCIENTIFIC APPROACH TO HEALTH

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Course Code: AECP17/27

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L

Course Coordinator: Dr. Anita Kanavalli

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### Course Content

#### Unit I

##### **Good Health and its balance for positive mindset (2 lecture hours)**

Health- its importance, factors, beliefs and behaviour, Good health benefits, Health and Society, Health and family, Health and Personality, Health and behaviour, Disparities of health in different vulnerable groups. Health and psychology, Methods to improve good psychological health. Psychological disorders (Stress and Health – Stress management), Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for YouTube videos/ Animation videos:  
[https://www.youtube.com/watch?v=71\\_NkXgAK1g](https://www.youtube.com/watch?v=71_NkXgAK1g)  
<https://www.youtube.com/watch?v=mwuahwbIBnE>

#### Unit II

##### **Building of healthy lifestyles for better future (3 lecture hours)**

Role of diet for good health, Food and health, Nutritional guidelines for good health and wellbeingness, Obesity and overweight disorders and its management, Eating disorders-proper exercises for its maintenance (Physical activities or health),Fitness components for health, Wellness and physical function.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos:  
<https://www.youtube.com/watch?v=c06dTj0v0sM>  
<https://www.youtube.com/watch?v=Y8HIFRPU6pM>

#### Unit III

##### **Creation of Healthy and caring relationships (3 lecture hours)**

Building communication skills (Listening and speaking), Friends and friendship - education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life(more than a biology), Changing health behaviours through social engineering.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos:  
<https://www.youtube.com/watch?v=IwZIFG-3Y4o>  
<https://www.youtube.com/watch?v=rzEI6ZVmGW8>

## Unit IV

### Avoiding risks and harmful habits (3 lecture hours)

Characteristics of health compromising behaviors, addictions -recognizing and avoiding, addictive behaviors, Types of addictions, influencing factors for addictions, Differences between addictive people and non addictive people and their behavior with society, Effects and health hazards from addictions.

- Pedagogy/Course delivery tools: Chalk and Talk
- Link for YouTube videos: [https://www.youtube.com/watch?v=S-12Zj\\_JIRQ](https://www.youtube.com/watch?v=S-12Zj_JIRQ)  
Animation videos: <https://www.youtube.com/watch?v=OnFVFFAlmEg>

## Unit V

### Preventing and fighting against diseases for good health (3 lecture hours)

Occurrence of infections and reasons, protection from different types of transmitted infections, Current trends of socioeconomic impact, Reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life, Health and Wellness of youth, Measuring of health and wealth status.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos:  
<https://www.youtube.com/watch?v=X0OxrsgAP2w>  
<https://www.youtube.com/watch?v=Ap1FXfy91d4>

### Text Books:

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY10017.
2. **Health Psychology A Textbook**, (Fourth Edition) by Jane Ogden McGraw-Hill Education (India) Private Limited- Open University Press

### Reference Books:

1. **Health Psychology (Ninth Edition)** by SHELLEYE. TAYLOR-University of California, Los Angeles , McGraw-Hill Education(India)Private Limited- Open University Press
2. **Scientific Foundations of Health (Health & Wellness)** - General Books published for university and colleges references by popular authors and published by the reputed publisher.

### Video Lectures:

SWAYAM/NPTL/MOOCs/Weblinks/InternetsourcesYouTubevideosandothermaterials/notes.

### Course Outcomes (COs):

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

1. Demonstrate the skills to live a healthy life and be a part of a healthy community. (PO-6, PO-7)

2. Learn how to use their stream of study towards sustainable living. (PO-7, PO-8)
3. Demonstrate the knowledge as a gateway for exchange of innovative thinking contributing to healthy individual and community. (PO-8, PO-9)
4. Learn to cultivate psycho-social behavioral quality. (PO-9, PO-10)
5. Understand the importance of science and scientific applications to enhance health. (PO-10, PO-12)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
MCQ /Casestudy/group activity with report writing	20	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
90 minutes (02 Hours duration)	50	CO1, CO2, CO3, CO4, CO5

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# CIVIL ENGINEERING MECHANICS

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Course Code: CVV18

Credits: 3:0:0

Pre-requisites: Nil

Contact Hours: 42L

Course Coordinator: Mr. Basavanagowda G M

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## Course Content

### Unit I

**Resultant of coplanar force system:** Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Engg. Mechanics: <https://a.impartus.com/ilc/#/video/id/532408>
- Resultants: <https://a.impartus.com/ilc/#/video/id/537603>

**Self Study:** Examples on drawing Free body diagram, Problems on Equivalent force-couple system.

### Unit II

**Equilibrium of coplanar force system:** Equilibrium of coplanar concurrent force system, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads. Numerical examples

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Equilibrium Concepts: <https://a.impartus.com/ilc/#/video/id/550330>

**Self Study:** Lami's theorem and problems on Lami's theorem.

### Unit III

**Analysis of Trusses:** Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.

**Friction:** Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, wedge friction, ladder friction Numerical examples.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Friction concepts: <https://www.youtube.com/watch?v=AlenFWwK3Ek>

**Self Study:** Types of friction, Problems on block friction on inclined plane.

## Unit IV

**Centroid of Plane areas:** Introduction, Locating the centroid of rectangle, triangle, circle, semicircle using method of integration, centroid of composite areas and simple built-up sections, Numerical examples.

**Moment of inertia of plane areas:** Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular and triangular from the method of integration, moment of inertia of composite areas and simple built up sections, Numerical examples.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Centroid: [https://www.youtube.com/watch?v=QK\\_TuE2lfSc](https://www.youtube.com/watch?v=QK_TuE2lfSc)
- Moment of Inertia: <https://www.youtube.com/watch?v=Bls5KnQOWkY>

**Self Study:** Derivation of moment of inertia for circle, semi circle and quarter circle - numericals.

## Unit V

**Kinematics:** Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion.

**Kinetics:** Introduction, D 'Alembert's principle of dynamic equilibrium and its application in-plane motion and connected bodies including pulleys, Numerical examples.

Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation

Kinematics: <https://www.youtube.com/watch?v=yfi16GW6468>

Kinetics: <https://www.youtube.com/watch?v=dmb1j-5A3RM>

**Self Study:** Projectiles : Introduction, numerical examples on projectiles.

### Text Book:

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

### Reference Books:

1. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
2. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
3. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
5. Bhavikatti S S, Engineering Mechanics, 2019, New Age International

- Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

### Web links and video Lectures (e- Resources):

- <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=atoP5_DeTPE)
- <https://www.youtube.com/watch?v=ksmsp9OzAsI>
- <https://www.youtube.com/watch?v=x1ef048b3CE>

### Course Outcomes (COs):

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

- Compute the resultant of a force system and resolution of a force
- Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces
- Analyse the frictional resistance offered by different planes and to identify compression and tension members in truss system under given loading condition
- Locate the centroid and compute the moment of inertia of sections
- Analyze the bodies in motion

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment	10	CO1, CO2
Assignment	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer one question from each unit –internal choice)	100	CO1, CO2, CO3, CO4, CO5

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## ENGINEERING PHYSICS LABORATORY

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**Course Code: PYLV19**

**Credits: 0:0:1**

**Pre-requisites: Nil**

**Contact Hours: 14L**

**Course Coordinator: Dr. Vaijyanthimala**

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### Course Contents

1. General Instructions and Introduction to Error Analysis.
  2. Plotting of forward and reverse bias characteristics of a Zener Diode and determination of breakdown voltage.
  3. Determination of numerical aperture, Acceptance angle and bending loss in Optical Fibre Cable.
  4. Measurement of capacitance and dielectric constant of a capacitor by charging and discharging it through a resistor.
  5. Calculation of Planck's constant using LEDs.
  6. Verification of Stefan's law
  7. Identification of different components (L,C or R) of a Black Box and calculation of their values through frequency response curves.
  8. Determination of Moment of inertia of an irregular body and rigidity modulus of the material of the suspension wire using torsional oscillations.
  9. Determination of Young's Modulus of the material of the single cantilever beam.
  10. Determination of Energy gap of semiconductor.
  11. Determination of Fermi energy of a metal.
  12. Measurement of operating wavelength of semiconductor laser using Laser diffraction.
  13. Calculation of thickness of given paper strip by the method of interference fringes (Air wedge).
  14. Frequency response of series and parallel LCR circuits and calculation of Q-factor and band width.
  15. Determination of Hall coefficient and concentration of charge carriers of the semiconductor.
  16. Simulation of electrical experiments using Pspice
- Students are required to perform 12 prescribed experiments (from 2 to 16) in the above list. Cyclic order will be followed.

### Reference Books:

1. Laboratory manual prepared by the Physics department, RIT, Bangalore

### Suggested Learning e-Resources (Web links and Video Lectures)

1. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
2. <https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html>
3. [https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)
4. <https://phet.colorado.edu>
5. <https://www.myphysicslab.com>

### Course Outcomes (COs):

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

1. Determine elastic constants of material using torsion pendulum and cantilever. (PO-1, PO-4)
2. Apply the concepts of interference and diffraction of light to determine thickness of thin films and wavelength of light. (PO-1, PO-4)
3. Construct and analyze simple AC and DC circuits to determine electrical parameters, familiarity with the concepts of modern Physics. (PO-1, PO-4, PO-5)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Weekly evaluation of laboratory journals/ reports after the conduction of every experiment.	30	CO1, CO2, CO3
Practical test	20	CO1, CO2, CO3
<b>Semester End Examination (SEE)</b>	50	CO1, CO2, CO3



**ELECTRICAL & ELECTRONICS  
ENGINEERING STREAM  
I SEMESTER**

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# ADVANCED CALCULUS AND LINEAR ALGEBRA

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Course Code: MAE11

Credits: 2:1:1

Pre-requisites: -

Contact Hours: 28L+14T+14P

Course Coordinator: Dr. G Neeraja

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## Course Contents

### Unit I

#### Differential Calculus

Polar curves, Angle between the radius vector and the tangent, Angle between the curves, Length of perpendicular from pole to the tangent, Pedal equations.

Derivative of arc length & Radius of Curvature in Cartesian, parametric & polar forms (without proof).

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

### Unit II

#### Linear Algebra

Elementary transformations on a matrix, Row Echelon form & rank of a matrix, Consistency of system of linear equations. Gauss elimination, Gauss – Seidel method to solve system of linear equations. Eigen values and Eigen vectors of a matrix, Rayleigh power method to determine the dominant Eigen value of a matrix, diagonalization of square matrices. Solution of system of ODEs by matrix method.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software MATLAB
- Links: <https://nptel.ac.in/courses/111/108/111108066/>  
<https://nptel.ac.in/courses/111/105/111105035/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/619570/1030>

### Unit III

#### Partial Differentiation and Vector Differentiation

**Partial Differentiation:** Partial derivatives, Euler's theorem Total differential coefficient, Differentiation of composite and implicit functions, Jacobians.

**Vector Differentiation:** Scalar and vector fields. Gradient, directional derivative, curl and divergence, physical interpretation, solenoidal and irrotational vector fields, vector identities.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/105/111105121/>  
<https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>  
<https://a.impartus.com/ilc/#/course/59742/295>

## Unit IV

### Multiple Integrals

Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Area by double integral and Volume by triple integral.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

## Unit V

### Vector Integration

Line integrals, surface integrals and volume integrals. Green's theorem (with proof), Stokes' theorem and Gauss divergence theorem (without proofs), Applications.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

### Lists of Laboratory experiments

1. 2D plots for Cartesian and polar curves
2. Finding angle between polar curves, curvature and radius of curvature of a given curve
3. Numerical solution of system of linear equations, test for consistency and graphical representation
4. Solution of system of linear equations using Gauss-Seidel iteration method
5. Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.
6. Finding Partial derivatives and Jacobian.
7. Finding gradient, divergent, curl and their geometrical interpretation.
8. Computing area and volume using multiple integrals
9. Verification of Green's theorem
10. Evaluating volume and surface integrals for a given vector point function.

### Text Books:

1. **B.S. Grewal** - Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> edition, 2021.
2. **Erwin Kreyszig** - Advanced Engineering Mathematics, Wiley publication, 10<sup>th</sup> edition, 2018.

### Reference Books:

1. **B. V. Ramana** - Higher Engineering Mathematics, Tata McGraw-Hill, 11<sup>th</sup> Edition, 2017.

2. **Srimanta Pal & Subodh C Bhunia** - Engineering Mathematics, Oxford University Press, 3<sup>rd</sup> Reprint, 2016.
3. **N.P.Bali and Manish Goyal:** “A textbook of Engineering Mathematics”, Laxmi publications, 10<sup>th</sup> edition ,2022.
4. **David C lay,** ” Linear Algebra and its Applications” Pearson publishers, 4<sup>th</sup> edition ,2018.

### Course Outcomes (COs):

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

1. Solve problems related to Polar curves, Radius of curvature. (PO-1, PO-2)
2. Solve system of linear equations and ordinary differential equations using matrices. (PO-1, PO-2)
3. Learn the concept of partial differentiation, Jacobian and apply vector differentiation to identify solenoidal and irrotational vectors. (PO-1, PO-2)
4. Evaluate multiple integrals and use them to find areas and volumes. (PO-1, PO-2)
5. Exhibit the interdependence of line, surface and volume integrals using integral theorems. (PO-1, PO-2)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken		
<b>Lab components</b>		
Conducting Experiment and Laboratory Record	15	CO1, CO2, CO3, CO4, CO5
Lab Test	05	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer any one question from each unit – Internal choice)	100	CO1, CO2, CO3, CO4, CO5

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# ENGINEERING CHEMISTRY

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Course Code: CYE12

Credits: 3:0:0

Pre-requisites: -

Contact Hours: 42L

Course Coordinators: Dr. B M Nagabhushana & Dr. Nagaraju Kottam

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## Course Content

### Unit I

#### Energy conversion and Battery Technology

**Energy Conversion:** Basic concepts of electrochemistry – electrode potential, origin of single electrode potential, Galvanic cells. Derivation of Nernst equation, Reference electrodes – calomel electrode, measurement of single electrode potential using saturated calomel electrode. Concentration cells. Numerical problems on electrode potential, EMF of cells and concentration cells.

**Battery Technology:** Basic concepts. Mechanism of battery operation, battery characteristics. Classification of batteries – Primary, secondary and reserve batteries. Modern batteries: construction, working and applications of Nickel-Metal hydride battery, Lithium (Lithium batteries).

**Self-study:** New generation Batteries: Introduction and Example- Al-air batteries and Solar energy storage batteries.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component / Practical Topics: Potentiometric titration using calomel & platinum electrode assembly. Determination of electrode potential of unknown metal using Nernst equation
- Links: Impartus video lectures: <http://msrit.edu/study-material/chemistry.html>

### Unit II

#### Corrosion Science and Engineering

**Corrosion Science Engineering:** Metallic corrosion - Definition, electrochemical theory of corrosion. Types of corrosion - Differential metal corrosion, differential aeration corrosion (Ex: pitting and waterline corrosion) and Stress corrosion. Factors affecting the rate of corrosion. Corrosion control Methods: Chemical Methods: Inorganic coatings- anodizing and phosphating. Corrosion inhibitors. Physical Methods: Cathodic Protection-sacrificial anode method. Metal coating- Anodic and cathodic metal coatings with examples.

**Self-study:** PCB: Electroless plating – Introduction, principle of Electroless plating of double – sided PCB

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component / Practical Topics: Analysis of iron content in steel solution by external indicator method.
- Links: Impartus videos:<http://msrit.edu/study-material/chemistry.html>

## Unit III

### Polymer Science, Liquid crystal and Display devices

**Polymer Science:** Introduction to high polymers. Glass transition temperature ( $T_g$ ), factors influencing  $T_g$ . Conducting polymers - Definition, mechanism of conduction in polyacetylene. High performance (Engineering) polymers: Synthesis, properties and applications of Teflon and PMMA.

**Liquid crystals:** Introduction, meaning, positional and orientational order in solid, liquid crystals and liquids. Director. Classification – thermotropic and lyotropic with examples. Liquid crystalline behavior in homologues series – PAA series. Applications of liquid crystals: In display system.

**Display Devices:** Properties and applications of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's)

**Self-study:** Types of mesophases – Nematic, Chiral nematic (cholesteric), Smectic and Columnar – arrangements of molecules with examples.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component / Practical Topics: Synthesis of urea-formaldehyde
- Links: Impartusvideos: <http://msrit.edu/study-material/chemistry.html>

## Unit IV

### Nanomaterials and Electrochemical Sensors

**Nanomaterials:** Introduction to nanomaterials. Synthesis: top-down and bottom-up approaches. Chemical methods of synthesis- solution combustion and hydrothermal methods. Characterization techniques like PXRD, SEM, and TEM (only mention & introduction). Applications of nanomaterials.

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

**Self-study:** Technological applications of oxide nano materials.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos
- Lab component / Practical Topics: Synthesis of nanomaterials by wet chemical methods, Determination of pH, Estimation of metals by colorimeter.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit V

### Energy Sources and E-Waste management

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

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

**E-Waste management:** Introduction, sources, types, effects of e-waste on environment and human health. Methods of disposal. Recycling – Advantages. Extraction of gold from e-waste

**Self-study:** Electrodes for electrostatic double layer capacitors, pseudo capacitors, and

hybrid capacitor.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## **Suggested Learning Resources:**

### **Text Books:**

1. **P. C. Jain and Monica Jain**, A text Book of Engineering Chemistry, Dhanapat Rai Publications, New Delhi, 17<sup>th</sup> Edition, 2018.
2. **R.V. Gadag and Nithyananda Shetty**, A text Book of Engineering Chemistry. Medtech Publishers. 1<sup>st</sup> Edition 2019.

### **Reference Books:**

1. F.W. Billmeyer, 'Text Book of Polymer Science', John Wiley & Sons, 4th Edition, 2007.
2. M.G. Fontana, N. D. Greene, 'Corrosion Engineering', McGraw Hill Publications, New York, 3rd Edition, 2005.
3. 'Principles of Physical Chemistry' B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 48th Edition 2019.
4. G.A.Ozin and A.C. Arsenault, "Nanochemistry: A Chemical approach to Nanomaterials", RSC Publishing, 2005.
5. 'Liquid Crystals' by S. Chandrashekar, Cambridge University Press, 2nd Edition, 2010
6. 'Introduction to Liquid Crystals' by Peter J. Collings. CRC Press, 2nd edition, 2019.
7. Introduction to E-Waste Management, by Lakshmi Raghupathy, TERI press, ISBN:9789386530196, First Edition, 2019.

### **Web links and Video Lectures (e-Resources):**

1. <http://msrit.edu/study-material/chemistry.html>
2. <https://nptel.ac.in/courses/122/101/122101001/>

### **Course Outcomes (COs):**

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

1. Apply the knowledge of electrochemistry to improve the efficiency of batteries. (PO-1, PO-2, PO-7).
2. Interpret the reasons of corrosion, monitor and control by using the proper techniques. (PO-1, PO-2, PO-7).
3. Apply the knowledge in synthesis of advanced polymers, conducting polymers and liquid crystal materials for different applications. (PO-1, PO-2, PO-7).
4. Apply the knowledge of wet chemical methods for the synthesis of nanomaterials and, Electrochemical sensors for diverse applications. (PO-1, PO-2, PO-7).

5. Apply different renewable sources of energy to generate power and, analyze the composition and management of E-waste. (PO-1, PO-2, PO-7).

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30	CO1, CO2, CO3
Internal test-II	30	CO3, CO4, CO5
Average of the two internal tests will be taken for 30 marks.		
<b>Other components:</b>		
Assignment	10	CO1, CO2, CO3, CO4, CO5
Quiz / MCQ	10	CO1, CO2, CO3, CO4, CO5
Average of the two assignment/quiz will be taken for 20 marks		
<b>Semester End Examination (SEE)</b>		
Semester end examination (Answer any one question from each unit – Internal choice)	100	CO1, CO2, CO3, CO4, CO5



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## PROFESSIONAL WRITING SKILLS IN ENGLISH

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Course Code: HSCC15/25

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L+14P

Course Coordinators: Dr. Premila Swamy D & Dr. Udayakumar H M

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### Course Contents

#### Unit I

##### Identifying Common Errors in Writing and Speaking English

Identifying common errors while using the parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord rules), Identifying common errors in usage of Subject-verb agreement and tenses

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill English Language.
- Links: Communication skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit II

##### Nature and Style of Sensible writing

Principles of formal writing, Building introduction, key points and conclusion, Importance of proper punctuation, Usage of connectives, Precise writing, Essay writing, words commonly confused/misused

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill.

#### Unit III

##### Technical Reading and Writing Practices

Introduction to technical writing, Report writing, Significance of reports, types of Reports, Introduction to Technical Proposal writing, Types of Technical Proposals, Characteristics of Technical Proposals, Grammar- Voices and Reported speech.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component: English Language Lab – Lanquill English Language Software – Grammar Exercises
- Links: Communication: <https://academicguides.waldenu.edu/writingcenter/grammar/subjectverbagreement>  
[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

## Unit IV

### Professional Communication for Employment

Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills, Reading Comprehension, Tips for effective reading, Job Application, Drafting effective resume/curriculum vitae, writing formal Email.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Reading & Writing Exercise

## Unit V

### Professional Communication Skills at Workplace

Intra and Interpersonal communication skills at workplace, Significance of non-verbal communication Group Discussion and Presentation skills, strategies for effective GD, and Presentation skills, Interview skills.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation.
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Presentation and GD Exercises.  
[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

### Text Books:

1. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press India Pvt Ltd- 2019.
2. Meenakshi Raman & Sangeetha Sharma - Technical communication – Principles and Practice Oxford University Press – 2007.
3. A.J. Thomson & A. V. Martinet, A Practical English Grammar, Oxford University Press –1987.

### Reference Books:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education (India) Private Limited-2005.
2. Dr. Premila D Swamy & Udayakumar H M, Communication skills for Engineers, Archers and Elevators Publishing House Bangalore, India, 2021.
3. S K. Khandelwal & R K Gupta, Functional Grammar & Composition, Laxmi Publication (P) Ltd.
4. N. Krishna Murthy, Modern English Grammar, Trinity press, 2016.
5. John Seely - The Oxford Guide to Effective Writing and Speaking. OUP, 2005.
6. Oxford Advanced Learners's Dictionary, 8th edition, 2013.
7. Martin Hewings - Advanced Grammar in Use, Cambridge University Press, 2013.

### Course Outcomes (COs):

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

1. Understand and identify the common errors in writing and speaking English. (PO-9, PO-10, PO-12)
2. Understand nuances of writing and enhance writing skills (PO-10, PO-12)
3. Learn and draft technical reports and writing. (PO-10, PO-12)
4. Use appropriate professional communication and writing practices. (PO-9, PO-10, PO-12)
5. Apply suitable presentation techniques in workplace environment. (PO-9, PO-10, PO-12)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30 (6 marks objective & 24 marks subjective pattern)	CO1,CO2,CO3
Internal test-II	30 (6 marks objective & 24 marks subjective pattern)	CO3,CO4,CO5
Average of the two internal tests will be taken for 30 marks.		
<b>Other components</b>		
Assignment-I	10	CO1, CO2, CO3
Assignment-II	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 (10 marks objective & 40 marks subjective pattern)	CO1,CO2,CO3,CO4,CO5

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# CONSTITUTION OF INDIA

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**Course Code: HSCC16/26**

**Credits: 1:0:0**

**Pre-requisites: Nil**

**Contact Hours: 14L**

**Course Coordinator: Mrs. Kanya Kumari S**

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## Course Contents

### Unit I

#### Introduction to the Constitution of India

Making of the Indian Constitution and its salient features, Preamble of the Constitution, Fundamental Rights and relevant cases.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit II

#### Relevance of Directive Principles of State Policy -part-IV

Fundamental Duties & their significance.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit III

#### Union executive and State executive

The organs of government -Union executive- the President of India, Vice President, Prime Minister & Council of Ministers. The Union Legislature, Compositions & the functions of Parliament and the Supreme court of India -composition & Jurisdictions State executive-Governor, Chief Minister& council of Ministers, State legislature-composition & functions of legislative assembly & legislative council and State Judiciary.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit IV

#### Emergency provisions and Special constitutional provisions in India.

Emergency provisions, kinds effects and proclamation of emergencies

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit V

#### Electoral process & Major Constitutional Amendments

Election commission of India & Electoral process, Amendment procedure and Major Constitutional amendments.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Text Books:

1. A Primer on Constitution of India & Professional ethics, VTU Publication-2007

## Reference Books:

1. **Durga Das Basu**, - 'Introduction to Constitution of India' - 19th/20th edition 2001
2. **M.V. Pylee** - 'An Introduction to Constitution of India, 4th edition, 2008
3. **Dr. K. R. Phaneesh** - 'Constitution of India & Professional ethics' –Sudha publication, Tenth revised edition 2018.

## Course Outcomes (COs):

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

1. Identify the fundamental principles of Indian constitution.(PO-12)
2. Examine various provisions of the Directive principles of state policies and fundamental duties .(PO-6,PO-12)
3. Understand the powers & functions of executive, Legislature and judicial system at the center and state level. ( PO-6, PO-12)
4. Identify the role of government. (PO-12)
5. Understand about basic Human rights in India (PO-6, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal test-I	30	CO1, CO2, CO3
Internal test-II	30	CO4, CO5
Average of the two internal tests will be taken for 30 marks.		
<b>Other components:</b>		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

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## DESIGN THINKING

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Course Code: AECC17/27

Credits: 2:0:0

Pre-requisites: Nil

Contact Hours: 28L

Course Coordinators: Dr. Christina Grace, Dr. Prabha Ravi

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### Course Content

#### Unit I

**Introduction:** Introduction to Design Thinking, Design and Business, Design Thinking for Education, Design Thinking Mindsets: Six Key Mindsets, Other Mindsets for Success

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Link: <https://www.youtube.com/watch?v=dAWwFG3X6u0>,
- <https://www.davidleedtech.org/>

#### Unit II

**The Design Thinking Process:** The Design Thinking Process, The Five Phases of Design Thinking: Empathize Phase, Self- Awareness and Partnerships, Interviews, Observations, Immersion, Research, Empathy Map, Projects, Define Phase, Synthesis: Finding Needs and Insights, Problem Statement, “How Might We” Question.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Link: <https://www.youtube.com/watch?v=5CUt2QQsJfc>

#### Unit III

**Ideate Phase and Prototyping:** Ideate Phase, Demystifying Creativity, Innovation, and Originality, Ideate Principles, Pre- Brainstorming: Mindset, Warm-Ups, and Practice, Prototype Phase, Rapid Prototyping, Prototyping in Action, Facilitation and Mentorship, Makerspace, Tools, and Materials.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Links: <https://youtu.be/M66ZU2PCiM>

#### Unit IV

**Testing Phase, Product life cycle and Value engineering:** Test Phase, Embracing Failure, Testing with End Users, Testing without End Users, Iteration; Product life cycle (Development, Introduction, Growth, Maturity, Decline), Value Engineering Job Plan, Case study on value engineering

- Pedagogy/Course delivery tools: Chalk and Talk, Powerpoint presentation, Videos
- Links: <https://youtube.com/watch?v=qgVs8vskWl0&feature=shares>  
[https://youtube.com/watch?v=85\\_Eet4o9QM&feature=shares](https://youtube.com/watch?v=85_Eet4o9QM&feature=shares)  
<https://youtube.com/watch?v=CkezCE3GmeQ&feature=shares>

## Unit V

**Case studies:** Case studies from YouTube: Amul and its innovation during pandemic, Asian Paints growth strategy, Prototype of smart village, Futuristic farms, Data driven design,

Case study from Jeanne Liedtka et al book: Redesigning the Customer Contact Center at Toyota, Rethinking Subsidized Meals for the Elderly at The Good Kitchen

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation
- Link: <https://youtu.be/nnwqtZiYMxQ>  
<https://youtu.be/jGT6ob8hV6M>  
<https://youtu.be/SlhE4--7lEM>  
<https://youtu.be/KfB2sx9uCkI>  
<https://youtu.be/Jh5xKBuvMIA>

### Text Book:

1. David Lee, Design Thinking in the Classroom, Ulysses Press, Korea, 2018

### Reference Books:

1. Jeanne Liedtka, Andrew King, Kevin Bennett - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover –2013
2. Roger Martin - The Design of Business: Why Design Thinking is the Next Competitive Advantage, Harvard Business Press, 2009.
3. Idris Mootee - Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School, John Wiley & Sons 2013.

### Web links and Video Lectures (e-Resources):

1. Stanford: Design Thinking [www.youtube.com/watch?v=GeUXQ\\_L-35M&feature=shares](http://www.youtube.com/watch?v=GeUXQ_L-35M&feature=shares)
2. Design thinking workshop: [www.youtube.com/channel/UCOjS4V\\_nBkylZpnlJFMJnTw](http://www.youtube.com/channel/UCOjS4V_nBkylZpnlJFMJnTw)
3. Design Thinking HBR [www.youtube.com/watch?v=z3IbHLfcyWo](http://www.youtube.com/watch?v=z3IbHLfcyWo)
4. Design Thinking: Solving Life's Problems [www.youtube.com/watch?v=UQYoW-wHg3qA](http://www.youtube.com/watch?v=UQYoW-wHg3qA)

### Course Outcomes (COs):

On successful completion of the course, students will be able to

1. Understand design thinking (PO-2, PO-6)
2. Understand and initiate design thinking process (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)
3. Generate and develop design ideas and prototype (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)
4. Test and analyse failures (PO-2, PO-4, PO-6)
5. Learn how Design Thinking can be applied (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment MCQ Quiz Presentation Model/Mini project Any other (Casestudy/ group activity with report writing	20	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Descriptive five units - internal choice unit wise	100 (scale downing to 50 marks)	CO1, CO2, CO3, CO4, CO5



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# COMPUTER - AIDED ENGINEERING DRAWING LABORATORY

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**Course Code: MELE18**

**Credits: 0:1:1**

**Pre-requisites: Nil**

**Contact Hours: 14T+14P**

**Course Coordinators: Dr. Mohandas K N**

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## Course Contents

### Course Learning Objectives:

1. To understand the basic and applied engineering drawings solutions by using suitable software.
2. To comprehend the criticality of development of typical lateral surfaces.
3. To visualize typical engineering components.

### Teaching-Learning (General Instructions):

- Students should be made aware of powerful engineering communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

## Unit I

### Introduction:

Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D environment. 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:

Orthographic projections: Definitions - Planes of projection, reference line and conventions employed, Projections of points in First and Third quadrants (**No problems**), Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (**No problems**). Orthographic Projections of Planes viz triangle, square, rectangle, pentagon, hexagon,

and circular laminae (**Placed in First quadrant only using change of position method**).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Orthographic Projections: <https://youtu.be/uePTMVQIIA4>
- Links: Orthographic projections of plane: <https://www.youtube.com/watch?v=GguSUMNxc8Q>

## Unit II

### Development of Lateral Surfaces of Solids:

Development of sectioned (**Section plane perpendicular to VP and inclined to HP bisecting the axis only**) lateral surfaces of right regular prism, cylinder, pyramid and cone resting **with base on HP only**.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Development of lateral surfaces: [https://www.youtube.com/watch?v=U5mz9\\_W-xdl](https://www.youtube.com/watch?v=U5mz9_W-xdl)

## Unit III

### Orthographic Projection of Solids:

Orthographic projection of right regular solids (**Solids Resting on HP only**): Prism & Pyramid (triangle, square, rectangle, pentagon, hexagon), Cylinder, Cone and Cube (No freely suspended problems).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Orthographic Projection of Solids: <https://youtu.be/-sUEGrynfJ0>

## Unit IV

### Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prism, pyramid, cylinder, cone, sphere and frustum of solid. Isometric projection of combination of two simple solids (**Co-axial only**).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Isometric Projection: <https://youtu.be/Vo9LC9d7FQA>

## Unit V

**Multidisciplinary Applications & Practice:** (For CIE only)

**Free hand Sketching:** True free hand, Guided Free hand, Roads.

**Drawing Simple Mechanisms:** Bicycles, Tricycles, Gear trains.

**Electric Wiring and lighting diagrams:** Like, Automatic fire alarm using suitable software

**Basic Building Drawing:** Architectural floor plan, basic foundation drawing using suitable software.

**Electronics Engineering Drawings:** Simple Electronics Circuit Drawings, practice on layers concept

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Free hand sketching: <https://www.youtube.com/watch?v=Ess0dmJB2lo>
- Links: Electric wiring and lighting diagram: <https://www.youtube.com/watch?v=c67wIH2IJL8>
- Links: Electronics Engineering Drawings: <https://www.youtube.com/watch?v=RpF7oFC-LPY>

## **Course Outcomes (COs):**

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

1. Demonstrate the usage of suitable software for creating basic and applied engineering drawings.
2. Conceptually sketch and draw developments for typical lateral surfaces.
3. Exhibit the knowledge of orthographic and isometric projections of typical solids.

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## ENGINEERING CHEMISTRY LABORATORY

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Course Code: CYLE19

Credits: 0:0:1

Pre-requisites: -

Contact Hours: 14P

Course Coordinators: Dr. Nagaraju Kottam & Dr. M N Manjunatha

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### Course Content

#### Part-A: Any Five (choice based)

##### Instrumental

1. Estimation of copper present in electroplating effluent by optical sensor (Colorimetrically).
2. Estimation of acid mixture (HCl & CH<sub>3</sub>COOH) by conductometric method.
3. Analysis of iron content present in E-waste effluent by potentiometrically.
4. Determination of pKa of vinegar using pH sensor (Membrane electrode - Glass electrode).
5. Estimation of sodium present in soil/an effluent sample using flame photometer.
6. Determination of Viscosity Coefficient of a lubricant sample (Ostwald's Viscometer).

#### Part-B: Any Five (choice-based)

##### Volumetric and other Techniques

1. Assessment of suitability of drinking and industrial water by estimation of total hardness by EDTA method.
2. Determination of COD of an industrial effluent sample.
3. Estimation of percentage of iron in rust solution.
4. Estimation of copper in electroplating effluent sample iodometrically.
5. Synthesis of semiconducting metal oxide (ZnO/Fe<sub>2</sub>O<sub>3</sub>/CuO) nanomaterial.
6. Determination of rate of corrosion of mild steel by weight loss method.

#### Part-C: (Demo Experiments)

1. Verification of Nernst's equation and measurement of single electrode potential.
2. Chemical structure drawing using software: Origin/ ACD/ChemSketch.
3. Analysis of cement by volumetric method
4. Synthesis of Urea-Formaldehyde polymer.
5. Preparation of a conducting polymer.

#### Reference Books:

1. Vogel's quantitative Chemical Analysis, Pearson Publication, 6th Edition, 2009.

2. Chemistry for Environmental Engineering, 5rd Edition, Clair N. Sawyer and Perry L, Mc. Carty; Mc. Graw-Hill Book Company, New York, 2003.
3. Chemistry Manual – RIT, 2022-23

### Web links and Video Lectures (e-Resources):

1. <http://msrit.edu/study-material/chemistry.html>

### Course Outcomes (COs):

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

1. Handle the apparatus in chemical laboratories for analysis of various materials (PO-1, PO-2, PO-7).
2. Analyze the suitability of water for domestic and industrial consumption (PO-1, PO-2, PO-7).
3. Synthesis of nano structured semiconducting and polymeric materials and evaluate the content and composition of new materials encountered in engineering applications (PO-1, PO-2, PO-7).

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Weekly evaluation of laboratory manuals/records after the Conduction of every experiment.	30	CO1, CO2, CO3
Practical test	20	CO1, CO2, CO3
<b>Semester End Examination (SEE)</b>		
Semester end examination (One / Two experiments, 2 or 3 hours)	50	CO1, CO2, CO3

# **MECHANICAL ENGINEERING STREAM I SEMESTER**

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## ADVANCED CALCULUS

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Course Code: MAM11

Credits: 2:1:1

Pre-requisites: Nil

Contact Hours: 28L+14T+14P

Course Coordinator: Dr. M V Govindaraju

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### Course Content

#### Unit I

**Differential Calculus-I:** Polar curves, Angle between the radius vector and the tangent, Angle between the curves, Length of perpendicular from pole to the tangent, Pedal equations. Derivative of arc length & Radius of Curvature in Cartesian, polar & parametric forms.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

#### Unit II

**Partial Differentiation:** Partial derivatives, Total differential coefficient, Differentiation of composite and implicit functions, Euler's theorem. Jacobians and properties.

**Vector differentiation:** Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence of a vector field, Solenoidal vector, Curl of a vector field, Irrotational vector, Laplacian operator. Physical interpretation of Gradient, Divergence and Curl.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

#### Unit III

**Reduction formula:** Reduction formulae for  $\sin^n x$ ,  $\cos^n x$ ,  $\sin^m x \cdot \cos^n x$ .

**Multiple integrals:** Evaluation of double and triple integrals, Change of order of integration, Change of variables. Applications of double and triple integrals to find areas and volumes.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

#### Unit IV

**Vector integration:** Line integrals, surface integrals and volume integrals. Green's theorem (with proof), Stokes' theorem and Gauss divergence theorem (without proofs). Calculation of work done, finding flux over a surface, computation of volume of a curved surface.

- Pedagogy / Course delivery tools: Chalk and talk, Videos

- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

## Unit V

**Linear Algebra:** Elementary transformations on a matrix, Echelon form & rank of a matrix, Consistency of system of linear equations. Gauss elimination & Gauss – Seidel method to solve system of linear equations. Applications to solve traffic flow problems and electric circuit problems. Eigenvalues and eigenvectors of a matrix, Rayleigh power method to determine the dominant eigenvalue of a matrix, diagonalization of square matrices. Solution of system of ODEs by matrix method.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/108/111108066/>  
<https://nptel.ac.in/courses/111/105/111105035/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/619570/1030>

### Text Books:

1. **George B. Thomas, Maurice D. Weir, Joel R. Hass** - Thomas' Calculus, Pearson, 13<sup>th</sup> edition, 2014.
2. **B. S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> edition, 2017

### Reference Books:

1. **Erwin Kreyszig** - Advanced Engineering Mathematics, Wiley publication, 10<sup>th</sup> edition, 2015.
2. **Srimanta Pal & Subodh C Bhunia** - Engineering Mathematics, Oxford University Press, 3<sup>rd</sup> Reprint, 2016.
3. **B. V. Ramana** - Higher Engineering Mathematics, Tata McGraw-Hill, 11<sup>th</sup> Edition, 2010.
4. **David C Lay** - Linear Algebra and its Applications, Pearson Publishers, 4<sup>th</sup> Ed., 2018.

### List of Laboratory experiments

1. Introduction to MATLAB (Creating MATLAB variables, Elementary mathematical operations, Plotting and customization of graphs, Control statements, m-file)
2. Plotting Polar curves, Calculating length of perpendicular from pole to the tangent for a polar curve, derivative of arc length of a given curve
3. Finding radius of curvatures for given curve in cartesian and polar form, finding Jacobian to transform from one coordinate system to another coordinate system
4. Finding Gradient, Divergence and Curl and plotting scalar field, vector field
5. Computation of derivative and single integral. Plotting regions using boundary conditions. Computing arc length of a curve, area, surface area of revolution using single integration



6. Finding area and volume using double and triple integral
7. Finding line integrals and verifying Green's theorem
8. Evaluating surface and volume integrals for a given vector point function
9. Solution of system of linear equations using Gauss elimination, Gauss – Seidel method
- 10 Solution of system of ODE using Eigen values and Eigen vectors

### Course Outcomes (COs):

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

1. Solve problems related to Polar curves, Radius of curvature. (PO-1, PO-2)
2. Apply vector differentiation to identify solenoidal and irrotational vectors and solve the problems related to Partial derivatives. (PO-1, PO-2)
3. Evaluate multiple integrals and use them to find areas and volumes. (PO-1, PO-2)
4. Exhibit the interdependence of line, surface and volume integrals using integral theorems. (PO-1, PO-2)
5. Solve system of linear equations and ordinary differential equations using matrices. (PO-1, PO-2)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30	CO1, CO2, CO3
Internal test-II	30	CO3, CO4, CO5
Average of the two internal tests will be taken		
<b>Lab components</b>		
Conducting Experiment and Laboratory Record	15	CO1, CO2, CO3, CO4, CO5
Lab Test	05	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer any one question from each unit – Internal choice)	100	CO1, CO2, CO3, CO4, CO5

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# ENGINEERING CHEMISTRY

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**Course Code:** CYM12

**Credits:** 3:0:0

**Pre-requisites:** Nil

**Contact Hours:** 42L

**Course Coordinators:** Dr. B M Nagabhushana & Dr. Nagaraju Kottam

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## Course Content

### Unit I

#### Chemical Energy Conversion and Battery Technology

**Chemical Energy Conversion:** Basic concepts of electrochemistry – electrode potential, the origin of single electrode potential, Galvanic cells. Derivation of Nernst equation, Reference electrodes – calomel electrode, measurement of single electrode potential using saturated calomel electrode. Concentration cells. Numerical problems on electrode potential, EMF of cells and concentration cells.

**Battery Technology:** Basic concepts. Mechanism of battery operation, battery characteristics. Classification of batteries – Primary, secondary and reserve batteries. Modern batteries: construction, working and applications of Nickel-Metal hydride and Li-ion (Lithium batteries) batteries.

**Self-study: New generation Batteries:** Introduction and Example- Al-air batteries. Capacitors, hybrid capacitors.

- Pedagogy / Course delivery tools: Chalk and talk, PowerPoint presentation, Videos.
- Lab component / Practical Topics: Potentiometric titration using calomel & platinum electrode assembly. Determination of electrode potential of unknown metal using Nernst equation
- Links: Impartus video lectures: <http://msrit.edu/study-material/chemistry.html>

### Unit II

#### Corrosion Science and Engineering

**Corrosion Science and Engineering:** Metallic corrosion - Definition, electrochemical theory of corrosion. Types of corrosion - Differential metal corrosion, differential aeration corrosion (Ex: pitting and waterline corrosion) and Stress corrosion. Factors affecting the rate of corrosion. Corrosion control Methods: Chemical Methods: Inorganic coatings- anodizing and phosphating. Corrosion inhibitors. Physical Methods: Cathodic Protection-sacrificial anode method. **Metal coating** - Anodic and cathodic metal coatings with examples.

**Self-study:** Multifunctional coatings (Thermal resistance, photo resistance and scratch resistance).

- Pedagogy / Course delivery tools: Chalk and talk, PowerPoint presentation, Videos.
- Lab component / Practical Topics: Analysis of iron content in steel solution by external indicator method.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit III

### Nanomaterials and Analytical Techniques

**Nanomaterials:** Introduction to nanomaterials. Synthesis: top-down and bottom-up approaches. Chemical methods of synthesis- solution combustion and hydrothermal methods. Characterization techniques like PXRD, SEM, and TEM (only mention & introduction). Applications of nanomaterials.

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

**Self-study:** Technological applications of nano metal oxides.

- Pedagogy / Course delivery tools: Chalk and talk, PowerPoint presentation, Videos
- Lab component / Practical Topics: Synthesis of nanomaterials by wet chemical methods, Determination of pH, Estimation of metals by a Colorimeter.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit IV

### Water Quality Analysis

**Water Quality Analysis:** Hardness – definition, types of hardness and its determination by EDTA method – numerical problems. Determination of dissolved (DO) oxygen by Winkler's method. Biological Oxygen Demand (BOD)–definition, determination and numerical problems. Chemical Oxygen Demand (COD) – Definition, determination and numerical problems. Determination of nitrate using phenol disulphonic acid (spectrophotometric method). Potable water – purification of water by reverse osmosis.

**Self-study:** Recycling of waste Water Physical, chemical and biological systems.

- Pedagogy / Course delivery tools: Chalk and talk, PowerPoint presentation, Videos.
- Lab component / Practical Topics: Determination of total hardness, COD of wastewater,
- Estimation of copper by colorimetric method and Measurement of conductivity of electrolytes
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit V

### Chemical Fuels and Polymer Science

**Chemical Fuels:** Introduction, characteristics of good fuel. Calorific value – Definition, net and gross calorific values. Determination of calorific value of solid fuel by bomb calorimeter. Numerical problems, Liquid fuels: Petroleum cracking - fluidized bed catalytic cracking, Reformation of petrol. Knocking – mechanism, octane number, cetane number, prevention of knocking.

**Polymer Science:** Introduction to high polymers. Glass transition temperature (T<sub>g</sub>), factors influencing T<sub>g</sub>. Conducting polymers - Definition, mechanism of conduction in polyacetylene. High performance (Engineering) polymers: Synthesis, properties and applications of Teflon and PMMA.

**Self-study:** Hydrogen Fuel, Bio-fuels: synthesis and advantages of Bio-diesel.

- Pedagogy / Course delivery tools: Chalk and talk, PowerPoint presentation, Videos.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

### **Text Books:**

1. P. C. Jain and Monica Jain, A text Book of Engineering Chemistry, Dhanapat Rai Publications, New Delhi, 17th Edition, 2018.
2. R.V. Gadag and Nithyananda Shetty, A text Book of Engineering Chemistry. Medtech Publishers. 1st Edition 2019.

### **Reference Books:**

1. F.W. Billmeyer, 'Text Book of Polymer Science, John Wiley & Sons, 4<sup>th</sup> Edition, 2007.
2. M.G. Fontana, N. D. Greene, 'Corrosion Engineering, McGraw Hill Publications, New York, 3<sup>rd</sup> Edition, 2005.
3. 'Principles of Physical Chemistry' B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 48<sup>th</sup> Edition 2019.
4. G.A. Ozin and A.C. Arsenault, "Nanochemistry: A Chemical approach to Nanomaterials", RSC Publishing, 2005.
5. 'Liquid Crystals' by S. Chandrashekar, Cambridge University Press, 2<sup>nd</sup> Edition, 2010
6. 'Introduction to Liquid Crystals' by Peter J. Collings. CRC Press, 2<sup>nd</sup> edition, 2019.

### **Web links and Video Lectures (e-Resources):**

1. <http://msrit.edu/study-material/chemistry.html>
2. <https://nptel.ac.in/courses/122/101/122101001/>

### **Course Outcomes (COs):**

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

1. Apply the knowledge of electrochemistry to improve the efficiency of batteries. (PO-1, PO-2, PO-7).
2. Interpret the reasons for corrosion, monitor and control by using the proper techniques. (PO-1, PO-2, PO-7).
3. Learn background on Nanoscience, the synthesis of nanomaterials and their applications and also select the required instruments/technique for analysis of the compounds.
4. Apply different conventional & renewable sources of energy to generate power. Have concept on rearing high octane quality fuels. (PO-1, PO-2, PO-7).
5. Analyze the water samples and will have the knowledge to obtain potable water using different techniques. (PO-1, PO-2, PO-7).
6. Apply the knowledge in the working of Chemical Fuels and synthesis of advanced polymers for different applications. (PO-1, PO-2, PO-7).

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30	CO1, CO2, CO3
Internal test-II	30	CO3, CO4, CO5
The average of the two internal tests will be taken for 30 marks.		
<b>Other components:</b>		
Assignment	10	CO1, CO2,CO3, CO4, CO5
MCQ/Quiz	10	CO1, CO2,CO3, CO4, CO5
The average of the two Assignments/quiz will be taken for 20 marks.		
<b>Semester End Examination (SEE)</b>		
Semester-end examination (Answer any one question from each unit– Internal choice)	100	CO1, CO2, CO3, CO4, CO5

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## PROFESSIONAL WRITING SKILLS IN ENGLISH

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Course Code: HSCC15/25

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L+14P

Course Coordinators: Dr. Premila Swamy D & Dr. Udayakumar H M

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### Course Contents

#### Unit I

##### Identifying Common Errors in Writing and Speaking English

Identifying common errors while using the parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord rules), Identifying common errors in usage of Subject-verb agreement and tenses

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill English Language.
- Links: Communication skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit II

##### Nature and Style of Sensible writing

Principles of formal writing, Building introduction, key points and conclusion, Importance of proper punctuation, Usage of connectives, Precise writing, Essay writing, words commonly confused/misused

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill.

#### Unit III

##### Technical Reading and Writing Practices

Introduction to technical writing, Report writing, Significance of reports, types of Reports, Introduction to Technical Proposal writing, Types of Technical Proposals, Characteristics of Technical Proposals, Grammar- Voices and Reported speech.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component: English Language Lab – Lanquill English Language Software – Grammar Exercises
- Links: Communication: <https://academicguides.waldenu.edu/writingcenter/grammar/subjectverbagreement>  
[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

## Unit IV

### Professional Communication for Employment

Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills, Reading Comprehension, Tips for effective reading, Job Application, Drafting effective resume/curriculum vitae, writing formal Email.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Reading & Writing Exercise

## Unit V

### Professional Communication Skills at Workplace

Intra and Interpersonal communication skills at workplace, Significance of non-verbal communication Group Discussion and Presentation skills, strategies for effective GD, and Presentation skills, Interview skills.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation.
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Presentation and GD Exercises.  
[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

### Text Books:

1. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press India Pvt Ltd- 2019.
2. Meenakshi Raman & Sangeetha Sharma - Technical communication – Principles and Practice Oxford University Press – 2007.
3. A.J. Thomson & A. V. Martinet, A Practical English Grammar, Oxford University Press –1987.

### Reference Books:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education (India) Private Limited-2005.
2. Dr. Premila D Swamy & Udayakumar H M, Communication skills for Engineers, Archers and Elevators Publishing House Bangalore, India, 2021.
3. S K. Khandelwal & R K Gupta, Functional Grammar & Composition, Laxmi Publication (P) Ltd.
4. N. Krishna Murthy, Modern English Grammar, Trinity press, 2016.
5. John Seely - The Oxford Guide to Effective Writing and Speaking. OUP, 2005.
6. Oxford Advanced Learners's Dictionary, 8th edition, 2013.
7. Martin Hewings - Advanced Grammar in Use, Cambridge University Press, 2013.

### Course Outcomes (COs):

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

1. Understand and identify the common errors in writing and speaking English. (PO-9, PO-10, PO-12)
2. Understand nuances of writing and enhance writing skills (PO-10, PO-12)
3. Learn and draft technical reports and writing. (PO-10, PO-12)
4. Use appropriate professional communication and writing practices. (PO-9, PO-10, PO-12)
5. Apply suitable presentation techniques in workplace environment. (PO-9, PO-10, PO-12)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30 (6 marks objective & 24 marks subjective pattern)	CO1,CO2,CO3
Internal test-II	30 (6 marks objective & 24 marks subjective pattern)	CO3,CO4,CO5
Average of the two internal tests will be taken for 30 marks.		
<b>Other components</b>		
Assignment-I	10	CO1, CO2, CO3
Assignment-II	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 (10 marks objective & 40 marks subjective pattern)	CO1,CO2,CO3,CO4,CO5



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# CONSTITUTION OF INDIA

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**Course Code: HSCC16/26**

**Credits: 1:0:0**

**Pre-requisites: Nil**

**Contact Hours: 14L**

**Course Coordinator: Mrs. Kanya Kumari S**

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## Course Content

### Unit I

#### Introduction to the Constitution of India

Making of the Indian Constitution and its salient features, Preamble of the Constitution, Fundamental Rights and relevant cases.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit II

#### Relevance of Directive Principles of State Policy -part-IV

Fundamental Duties & their significance.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit III

#### Union executive and State executive

The organs of government -Union executive- the President of India, Vice President, Prime Minister & Council of Ministers. The Union Legislature, Compositions & the functions of Parliament and the Supreme court of India -composition & Jurisdictions State executive-Governor, Chief Minister& council of Ministers, State legislature-composition & functions of legislative assembly& legislative council and State Judiciary.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit IV

#### Emergency provisions and Special constitutional provisions in India.

Emergency provisions, kinds effects and proclamation of emergencies

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit V

#### Electoral process & Major Constitutional Amendments

Election commission of India & Electoral process, Amendment procedure and Major Constitutional amendments.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Text Books:

1. A Primer on Constitution of India & Professional ethics, VTU Publication-2007

## Reference Books:

1. **Durga Das Basu**, - ' Introduction to Constitution of India' - 19th/20th edition 2001
2. **M.V.Pylee**. - ' An Introduction to Constitution of India, 4th edition, 2008
3. **Dr. K. R. Phaneesh**, - 'Constitution of India & Professional ethics' –Sudha publication, Tenth revised edition 2018.

## Course Outcomes (COs):

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

1. Identify the fundamental principles of Indian constitution.(PO-12)
2. Examine various provisions of the Directive principles of state policies and fundamental duties .(PO-6,PO-12)
3. Understand the powers & functions of executive, Legislature and judicial system at the center and state level. ( PO-6, PO-12)
4. Identify the role of government. (PO-12)
5. Understand about basic Human rights in India (PO-6, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE) : 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal test-I	30	CO1, CO2, CO3
Internal test-II	30	CO4, CO5
Average of the two internal tests will be taken for 30 marks.		
<b>Other components:</b>		
Assignment	10	CO1, CO2
quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

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# DESIGN THINKING

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Course Code: AECC17/27

Credits: 2:0:0

Pre-requisites: Nil

Contact Hours: 28L

Course Coordinators: Dr. Christina Grace, Dr. Prabha Ravi

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## Course Content

### Unit I

**Introduction:** Introduction to Design Thinking, Design and Business, Design Thinking for Education, Design Thinking Mindsets: Six Key Mindsets, Other Mindsets for Success

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Link: <https://www.youtube.com/watch?v=dAWwFG3X6u0>,
- <https://www.davidleedtech.org/>

### Unit II

**The Design Thinking Process:** The Design Thinking Process, The Five Phases of Design Thinking: Empathize Phase, Self- Awareness and Partnerships, Interviews, Observations, Immersion, Research, Empathy Map, Projects, Define Phase, Synthesis: Finding Needs and Insights, Problem Statement, “How Might We” Question.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Link: <https://www.youtube.com/watch?v=5CUt2QQsJfc>

### Unit III

**Ideate Phase and Prototyping:** Ideate Phase, Demystifying Creativity, Innovation, and Originality, Ideate Principles, Pre- Brainstorming: Mindset, Warm-Ups, and Practice, Prototype Phase, Rapid Prototyping, Prototyping in Action, Facilitation and Mentorship, Makerspace, Tools, and Materials.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Links: <https://youtu.be/M66ZU2PCiM>

### Unit IV

**Testing Phase, Product life cycle and Value engineering:** Test Phase, Embracing Failure, Testing with End Users, Testing without End Users, Iteration; Product life cycle (Development, Introduction, Growth, Maturity, Decline), Value Engineering Job Plan, Case study on value engineering

- Pedagogy/Course delivery tools: Chalk and Talk, Powerpoint presentation, Videos
- Links: <https://youtube.com/watch?v=qgVs8vskWl0&feature=shares>  
[https://youtube.com/watch?v=85\\_Eet4o9QM&feature=shares](https://youtube.com/watch?v=85_Eet4o9QM&feature=shares),  
<https://youtube.com/watch?v=CkezCE3GmeQ&feature=shares>

## Unit V

**Case studies:** Case studies from YouTube: Amul and its innovation during pandemic, Asian Paints growth strategy, Prototype of smart village, Futuristic farms, Data driven design,

Case study from Jeanne Liedtka et al book: Redesigning the Customer Contact Center at Toyota, Rethinking Subsidized Meals for the Elderly at The Good Kitchen

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation

Link: <https://youtu.be/nnwqtZiYMxQ>

<https://youtu.be/jGT6ob8hV6M>

<https://youtu.be/SlhE4--7lEM>

<https://youtu.be/KfB2sx9uCkI>

<https://youtu.be/Jh5xKbuvMIA>

### Text Book:

1. David Lee, Design Thinking in the Classroom, Ulysses Press, Korea, 2018

### Reference Books:

1. Jeanne Liedtka, Andrew King, Kevin Bennett - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover –2013
2. Roger Martin - The Design of Business: Why Design Thinking is the Next Competitive Advantage, Harvard Business Press, 2009.
3. Idris Mootee - Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School, John Wiley & Sons 2013.

### Web links and Video Lectures (e-Resources):

1. Stanford: Design Thinking [www.youtube.com/watch?v=GeUXQ\\_L-35M&feature=shares](http://www.youtube.com/watch?v=GeUXQ_L-35M&feature=shares)
2. Design thinking workshop: [www.youtube.com/channel/UCOjS4V\\_nBkylZ-pnlJFMJnTw](http://www.youtube.com/channel/UCOjS4V_nBkylZ-pnlJFMJnTw)
3. Design Thinking HBR [www.youtube.com/watch?v=z3IbHLfeyWo](http://www.youtube.com/watch?v=z3IbHLfeyWo)
4. Design Thinking: Solving Life's Problems [www.youtube.com/watch?v=UQYyWwHg3qA](http://www.youtube.com/watch?v=UQYyWwHg3qA)

### Course Outcomes (COs):

On successful completion of the course, students will be able to

1. Understand design thinking (PO-2, PO-6)
2. Understand and initiate design thinking process (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)
3. Generate and develop design ideas and prototype (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)
4. Test and analyse failures (PO-2, PO-4, PO-6)
5. Learn how Design Thinking can be applied (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment MCQ Quiz Presentation Model/Mini project Any other (Casestudy/ group activity with report writing	20	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Descriptive five units - internal choice unit wise	100 (scale downing to 50 marks)	CO1, CO2, CO3, CO4, CO5

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# COMPUTER AIDED ENGINEERING DRAWING LABORATORY

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Course Code: MELM18

Credits: 0:1:1

Pre-requisites: Nil

Contact Hours: 14T+14P

Course Coordinator: Dr. Mohandas K N

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## Course Contents

### Course Learning Objectives:

1. To understand the basic and applied engineering drawings solutions by using suitable software.
2. To comprehend the criticality of development of typical lateral surfaces.
3. To visualize typical engineering components.

### Teaching-Learning (General Instructions):

- Students should be made aware of powerful engineering communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

## Unit I

### Introduction:

Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D environment. 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:

Orthographic projections: Definitions - Planes of projection, reference line and conventions employed, Projections of points in First and Third quadrants (**No problems**), Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (**No problems**). Orthographic Projections of Planes viz triangle, square, rectangle, pentagon, hexagon,

and circular laminae (**Placed in First quadrant only using change of position method**).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Orthographic Projections: <https://youtu.be/uePTMVQIIA4>
- Links: Orthographic projections of plane: <https://www.youtube.com/watch?v=GguSUMNxc8Q>

## Unit II

### Development of Lateral Surfaces of Solids:

Development of sectioned (**Section plane perpendicular to VP and inclined to HP bisecting the axis only**) lateral surfaces of right regular prism, cylinder, pyramid and cone resting **with base on HP only**.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Development of lateral surfaces: [https://www.youtube.com/watch?v=U5mz9\\_W-xdl](https://www.youtube.com/watch?v=U5mz9_W-xdl)

## Unit III

### Orthographic Projection of Solids:

Orthographic projection of right regular solids (**Solids Resting on HP only**): Prism & Pyramid (triangle, square, rectangle, pentagon, hexagon), Cylinder, Cone and Cube (No freely suspended problems).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Orthographic Projection of Solids: <https://youtu.be/-sUEGrynfJ0>

## Unit IV

### Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prism, pyramid, cylinder, cone, sphere and frustum of solid. Isometric projection of combination of two simple solids (**Co-axial only**).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Isometric Projection: <https://youtu.be/Vo9LC9d7FQA>

## Unit V

**Multidisciplinary Applications & Practice:** (For CIE only)

**Free hand Sketching:** True free hand, Guided Free hand, Roads.

**Drawing Simple Mechanisms:** Bicycles, Tricycles, Gear trains.

**Electric Wiring and lighting diagrams:** Like, Automatic fire alarm using suitable software

**Basic Building Drawing:** Architectural floor plan, basic foundation drawing using suitable software.

**Electronics Engineering Drawings:** Simple Electronics Circuit Drawings, practice on layers concept

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Free hand sketching: <https://www.youtube.com/watch?v=Ess0dmJB2lo>
- Links: Electric wiring and lighting diagram: <https://www.youtube.com/watch?v=c67wIH2IJL8>
- Links: Electronics Engineering Drawings: <https://www.youtube.com/watch?v=RpF7oFC-LPY>

### **Course Outcomes (COs):**

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

1. Demonstrate the usage of suitable software for creating basic and applied engineering drawings.
2. Conceptually sketch and draw developments for typical lateral surfaces.
3. Exhibit the knowledge of orthographic and isometric projections of typical solids.



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## ENGINEERING CHEMISTRY LABORATORY

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Course Code: CYLM19

Credits: 0:0:1

Pre-requisites: Nil

Contact Hours: 14P

Course Coordinators: Dr. Nagaraju Kottam & Dr. M N Manjunatha

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### Course Content

#### **Part-A: Any Five (choice based)**

##### **Instrumental**

1. Estimation of copper present in electroplating effluent by optical sensor (Colorimetrically).
2. Estimation of acid mixture (HCl & CH<sub>3</sub>COOH) by conductometric method.
3. Analysis of iron content present in E-waste effluent by potentiometrically.
4. Determination of pKa of vinegar using pH sensor (Membrane electrode - Glass electrode).
5. Estimation of sodium present in soil/an effluent sample using flame photometer.
6. Determination of Viscosity Coefficient of a lubricant sample (Ostwald's Viscometer).

#### **Part-B: Any Five (choice-based)**

##### **Volumetric and other Techniques**

1. Assessment of suitability of drinking and industrial water by estimation of total hardness by EDTA method.
2. Determination of COD of an industrial effluent sample.
3. Estimation of percentage of iron in rust solution.
4. Estimation of copper in electroplating effluent sample iodometrically.
5. Synthesis of semiconducting metal oxide (ZnO/Fe<sub>2</sub>O<sub>3</sub>/CuO) nanomaterial.
6. Determination of rate of corrosion of mild steel by weight loss method.

#### **Part-C: (Demo Experiments)**

1. Verification of Nernst's equation and measurement of single electrode potential.
2. Chemical structure drawing using software: Origin/ ACD/ChemSketch.
3. Analysis of cement by volumetric method
4. Synthesis of Urea-Formaldehyde polymer.
5. Preparation of a conducting polymer.

### Reference Books:

1. Vogel's quantitative Chemical Analysis, Pearson Publication, 6th Edition, 2009.
2. Chemistry for Environmental Engineering, 5rd Edition, Clair N. Sawyer and Perry L, Mc. Carty; Mc. Graw-Hill Book Company, New York, 2003.
3. Chemistry Manual – RIT, 2022-23

### Web links and Video Lectures (e-Resources):

1. <http://msrit.edu/study-material/chemistry.html>

### Course Outcomes (COs):

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

1. Handle the apparatus in chemical laboratories for analysis of various materials (PO-1, PO-2, PO-7).
2. Analyze the suitability of water for domestic and industrial consumption (PO-1, PO-2, PO-7).
3. Evaluate the content and composition of new materials encountered in engineering applications (PO-1, PO-2, PO-7).

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Weekly evaluation of laboratory manuals/records after the Conduction of every experiment.	30	CO1, CO2, CO3
Practical test	20	CO1, CO2, CO3
<b>Semester End Examination (SEE)</b>		
Semester end examination (One / Two experiments, 2 or 3 hours)	50	CO1, CO2, CO3

**COMPUTER SCIENCE & ENGINEERING  
STREAM  
II SEMESTER**

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# NUMERICAL TECHNIQUES AND DIFFERENTIAL EQUATIONS

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**Course Code: MAC21**

**Credits: 2:1:1**

**Pre-requisites: -**

**Contact Hours: 28L+14T+14P**

**Course Coordinators: Dr. Monica Anand & Mr. B. Azghar Pasha**

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## Course Content

### Unit I

**Series Expansion of Functions & their Applications:** Taylor's series and Maclaurin's series expansion of one variable (without proof) and its applications to solve algebraic and transcendental equations - Newton-Raphson method.

Taylor's series and Maclaurin's series expansion of two variables (without proof) and its applications to solve the system of nonlinear equations - Newton-Raphson method. Maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/106/111106101/>  
<https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>  
<https://a.impartus.com/ilc/#/course/619570/1030>

### Unit II

**First order and first degree differential equations:** Applications of first order and first degree differential equations to solve simple electric circuit problems, Newton's law of cooling and orthogonal trajectories.

**Numerical solution of first order ODE:** Taylor's series method, Euler's & modified Euler's method, fourth order Runge-Kutta method.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/106/111106100/>  
<https://nptel.ac.in/courses/111/106/111106101/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>  
<https://a.impartus.com/ilc/#/course/619570/1030>

### Unit III

**Linear differential equations of higher Order:** Linear differential equations of higher order with constant coefficients. Cauchy's and Legendre's linear differential equations, Method of variation of parameters – Engineering applications.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>

## Unit IV

**Interpolation:** Forward and Backward differences, Interpolation, Newton-Gregory Forward and Backward Interpolation, Lagrange's interpolation and Newton's divided difference interpolation techniques (no proof).

**Numerical Differentiation:** Derivatives using Newton-Gregory forward and backward interpolation formula.

**Numerical Integration:** Newton-Cotes quadrature formula: Trapezoidal, Simpson's 1/3rd and Simpson's 3/8th rule (no proof).

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/106/111106101/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/96127/452>  
<https://a.impartus.com/ilc/#/course/132243/636>

## Unit V

**Linear Algebra:** Elementary transformations on a matrix, Echelon form & rank of a matrix, Consistency of system of linear equations. Gauss elimination, Gauss – Seidel method to solve system of linear equations. Eigen values and eigen vectors of a matrix, Rayleigh power method to determine the dominant eigen value of a matrix, diagonalization of square matrices. Solution of system of ODEs by matrix method.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/108/111108066/>  
<https://nptel.ac.in/courses/111/105/111105035/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/619570/1030>

### Text Book:

1. **George B. Thomas, Maurice D. Weir, Joel R. Hass** - Thomas' Calculus, Pearson, 13<sup>th</sup> edition, 2014.
2. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> edition, 2017.

### Reference Books:

1. **Erwin Kreyszig** - Advanced Engineering Mathematics, Wiley publication, 10<sup>th</sup> edition, 2015.
2. **Peter V. O' Neil** - Advanced Engineering Mathematics, Thomson Brooks/Cole, 7<sup>th</sup> edition, 2011.
3. **Glyn James & Phil Dyke** - Advanced Modern Engineering Mathematics, Pearson Education, 5<sup>th</sup> edition, 2018.
4. **Srimanta Pal & Subobh C Bhunia** - Engineering Mathematics, Oxford University Press, 3<sup>rd</sup> Reprint, 2016.

## Course Outcomes (COs):

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

1. Determine extreme values, roots of algebraic & transcendental equations and solution of non-linear system of equations. (PO-1, PO-2)
2. Solve first order differential equations analytically and numerically. (PO-1, PO-2)
3. Solve higher order linear differential equations with constant and variable coefficients. (PO-1, PO-2)
4. Interpolate, differentiate and integrate a given set of tabulated data (PO-1, PO-2)
5. Solve system of linear equations and ordinary differential equations using matrices. (PO-1, PO-2)

## List of Programs:

1. Analyzing extreme values of functions of two variables
2. Finding the roots of algebraic and transcendental equations using Newton-Raphson method
3. Solution of system of non-linear equations using Newton-Raphson method
4. Taylor's series and Euler's method to solve ODE's of first order and first degree
5. Modified Euler's method & Runge-Kutta method of 4<sup>th</sup> order to solve first order and first degree ODE's
6. Solution of higher order ODE's
7. Interpolation/Extrapolation for equispaced and unequispaced data
8. Evaluation of definite integrals using Trapezoidal, Simpson's (1/3)<sup>rd</sup> and (3/8)<sup>th</sup> rule
9. Gauss-Seidel iteration method to solve the system of linear equations
10. Finding the largest eigen value and the corresponding eigen vector using Rayleigh power method.

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two tests shall be taken		
<b>Lab components</b>		
Conducting Experiment and Laboratory Record	15	CO1, CO2, CO3, CO4, CO5
Lab Test	05	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer any one question from each unit – Internal choice)	100	CO1, CO2, CO3, CO4, CO5

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# ENGINEERING CHEMISTRY

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**Course Code:** CYC22

**Credits:** 3:0:0

**Pre-requisites:** -

**Contact Hours:** 42L

**Course Coordinators:** Dr. B M Nagabhushana & Dr. Nagaraju Kottam

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## Course Content

### Unit I

#### Energy Conversion and Battery Technology

**Energy Conversion:** Basic concepts of electrochemistry – electrode potential, origin of single electrode potential, Galvanic cells. Derivation of Nernst equation, Reference electrodes – calomel electrode, measurement of single electrode potential using saturated calomel electrode. Concentration cells. Numerical problems on electrode potential, EMF of cells and concentration cells.

**Battery Technology:** Basic concepts. Mechanism of battery operation, battery characteristics. Classification of batteries – Primary, secondary and reserve batteries. Modern batteries: construction, working and applications of Nickel-Metal hydride battery, Li-ion (Lithium batteries).

**Self-study:** New generation Batteries: Introduction and Example- Al-air batteries.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Lab component/Practical Topics: Potentiometric titration using calomel & platinum electrode assembly. Determination of electrode potential of unknown metal using Nernst equation
- Links: Impartus video lectures: <http://msrit.edu/study-material/chemistry.html>

### Unit II

#### Corrosion Science and Engineering

**Corrosion Science and Engineering:** Metallic corrosion - Definition, electrochemical theory of corrosion. Types of corrosion - Differential metal corrosion, differential aeration corrosion (Ex: pitting and waterline corrosion) and Stress corrosion. Factors affecting the rate of corrosion. Corrosion control Methods: Chemical Methods: Inorganic coatings- anodizing and phosphating. Corrosion inhibitors. Physical Methods: Cathodic Protection-sacrificial anode method. Metal coating- Anodic and cathodic metal coatings with examples.

**Self-study: PCB:** Electroless plating – Introduction, Electroless plating of double – sided PCB.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Lab component/Practical Topics: Analysis of iron content in steel solution by external indicator method.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit III

### Polymer Science, Liquid Crystal and Display Devices

**Polymer Science:** Introduction to high polymers. Glass transition temperature ( $T_g$ ), factors influencing  $T_g$ . Conducting polymers - Definition, mechanism of conduction in polyacetylene. High performance (Engineering) polymers: Synthesis, properties and applications of Teflon and PMMA.

**Liquid Crystal and Display Devices:** Introduction, meaning, positional and orientational order in solid, liquid crystals and liquids. Director. Classification – thermotropic and lyotropic with examples. Liquid crystalline behavior in homologues series – PAA series. Applications of liquid crystals: In display system.

**Display Devices:** Properties and applications of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's)

**Self-study:** Types of mesophases – Nematic, Chiral nematic (cholesteric), Smectic and Columnar – arrangements of molecules with examples.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Lab component/Practical Topics: Synthesis of urea-formaldehyde
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit IV

### Nanomaterials and Electrochemical Sensors

**Nanomaterials:** Introduction to nanomaterials. Synthesis: top-down and bottom-up approaches. Chemical methods of synthesis- solution combustion and hydrothermal methods. Characterization techniques like PXRD, SEM, and TEM (only mention & introduction). Applications of nanomaterials.

**Electrochemical Sensors:** Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, optical sensors (colorimetric); its application in the estimation of the copper. pH-sensor (Glass electrode); its application in the determination of pH of beverages.

**Self-study:** Technological applications of nano oxide materials.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Lab component/Practical Topics: Synthesis of nanomaterials by wet chemical methods, Determination of pH, Estimation of metals by colorimeter.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit V

### Fuel Cells, Solar Energy and E-Waste Management

**Fuel Cells:** Introduction, construction, working and applications of methanol-oxygen and polymer electrolyte fuel cell.

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

**E-Waste Management:** Introduction, Chemical composition of E-waste, sources, types, effects of e-waste on environment and human health. Methods of disposal. Recycling – Advantages.



**Self-study:** Electrodes for electrostatic double layer capacitors, pseudo capacitors and hybrid capacitor.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## **Suggested Learning Resources:**

### **Text Book:**

1. **P. C. Jain and Monica Jain**, A text Book of Engineering Chemistry, DhanapatRai Publications, New Delhi, 17<sup>th</sup> Edition, 2018.
2. **R.V. Gadag and Nithyananda Shetty**, A text Book of Engineering Chemistry. Medtech Publishers. 1<sup>st</sup> Edition 2019.

### **Reference Books:**

1. F.W. Billmeyer, 'Text Book of Polymer Science', John Wiley & Sons, 4<sup>th</sup> Edition, 2007.
2. M.G. Fontana, N. D. Greene, 'Corrosion Engineering', McGraw Hill Publications, New York, 3<sup>rd</sup> Edition, 2005.
3. 'Principles of Physical Chemistry' B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 48<sup>th</sup> Edition 2019.
4. G.A.Ozin and A.C. Arsenault, "Nanochemistry: A Chemical approach to Nanomaterials", RSC Publishing, 2005.
5. 'Liquid Crystals' by S. Chandrashekar, Cambridge University Press, 2<sup>nd</sup> Edition, 2010
6. 'Introduction to Liquid Crystals' by Peter J. Collings. CRC Press, 2<sup>nd</sup> edition, 2019.
7. E-waste and Environmental Issues by Bhalla Resham, Discovery Publishing House Pvt Ltd, 2017.

### **Web links and Video Lectures (e-Resources):**

1. <http://msrit.edu/study-material/chemistry.html>
2. <https://nptel.ac.in/courses/122/101/122101001/>

### **Course Outcomes (COs):**

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

1. Apply the knowledge of electrochemistry to improve the efficiency of batteries. (PO-1, PO-2, PO-7).
2. Interpret the reasons of corrosion, monitor and control by using the proper techniques. (PO-1, PO-2, PO-7).
3. Apply the knowledge in synthesis of advanced polymers, conducting polymers and liquid crystal materials for different applications. (PO-1, PO-2, PO-7).
4. Understand the synthesis of nanomaterials, principle and instrumentation of electrochemical sensors, and their applications. (PO-1, PO-2, PO-7).

5. Understand the working principle of different types of fuel cells, PV cell and know about the environmental impacts of e-waste. (PO-1, PO-2, PO-7).

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests will be taken for 30 marks.		
<b>Other components:</b>		
Assignment	10	CO1,CO2,CO3,CO4,CO5
Quiz/MCQ	10	CO1,CO2,CO3,CO4,CO5
Average of the two assignment/quiz will be taken for 20 marks.		
<b>Semester End Examination (SEE)</b>		
Semester end examination (Answer any one question from each unit– Internal choice)	100	CO1,CO2,CO3,CO4,CO5

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## PROFESSIONAL WRITING SKILLS IN ENGLISH

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Course Code: HSCC15/25

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L+14P

Course Coordinators: Dr. Premila Swamy D & Dr. Udayakumar H M

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### Course Contents

#### Unit I

##### Identifying Common Errors in Writing and Speaking English

Identifying common errors while using the parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord rules), Identifying common errors in usage of Subject-verb agreement and tenses

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill English Language.
- Links: Communication skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit II

##### Nature and Style of Sensible writing

Principles of formal writing, Building introduction, key points and conclusion, Importance of proper punctuation, Usage of connectives, Precise writing, Essay writing, words commonly confused/misused

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill.

#### Unit III

##### Technical Reading and Writing Practices

Introduction to technical writing, Report writing, Significance of reports, types of Reports, Introduction to Technical Proposal writing, Types of Technical Proposals, Characteristics of Technical Proposals, Grammar- Voices and Reported speech.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component: English Language Lab – Lanquill English Language Software – Grammar Exercises
- Links: Communication: <https://academicguides.waldenu.edu/writingcenter/grammar/subjectverbagreement>  
[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

## Unit IV

### Professional Communication for Employment

Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills, Reading Comprehension, Tips for effective reading, Job Application, Drafting effective resume/curriculum vitae, writing formal Email.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Reading & Writing Exercise

## Unit V

### Professional Communication Skills at Workplace

Intra and Interpersonal communication skills at workplace, Significance of non-verbal communication Group Discussion and Presentation skills, strategies for effective GD, and Presentation skills, Interview skills.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation.
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Presentation and GD Exercises.

[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

### Text Books:

1. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press India Pvt Ltd- 2019.
2. Meenakshi Raman & Sangeetha Sharma - Technical communication – Principles and Practice Oxford University Press – 2007.
3. A.J. Thomson & A. V. Martinet, A Practical English Grammar, Oxford University Press –1987.

### Reference Books:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education (India) Private Limited-2005.
2. Dr. Premila D Swamy & Udayakumar H M, Communication skills for Engineers, Archers and Elevators Publishing House Bangalore, India, 2021.
3. S K. Khandelwal & R K Gupta, Functional Grammar & Composition, Laxmi Publication (P) Ltd.
4. N. Krishna Murthy, Modern English Grammar, Trinity press, 2016.
5. John Seely - The Oxford Guide to Effective Writing and Speaking. OUP, 2005.
6. Oxford Advanced Learners's Dictionary, 8th edition, 2013.
7. Martin Hewings - Advanced Grammar in Use, Cambridge University Press, 2013.

### Course Outcomes (COs):

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

1. Understand and identify the common errors in writing and speaking English. (PO-9, PO-10, PO-12)
2. Understand nuances of writing and enhance writing skills (PO-10, PO-12)
3. Learn and draft technical reports and writing. (PO-10, PO-12)
4. Use appropriate professional communication and writing practices. (PO-9, PO-10, PO-12)
5. Apply suitable presentation techniques in workplace environment. (PO-9, PO-10, PO-12)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30 (6 marks objective & 24 marks subjective pattern)	CO1,CO2,CO3
Internal test-II	30 (6 marks objective & 24 marks subjective pattern)	CO3,CO4,CO5
Average of the two internal tests will be taken for 30 marks.		
<b>Other components</b>		
Assignment-I	10	CO1, CO2, CO3
Assignment-II	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 (10 marks objective & 40 marks subjective pattern)	CO1,CO2,CO3,CO4,CO5

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# CONSTITUTION OF INDIA

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**Course Code: HSCC16/26**

**Credits: 1:0:0**

**Pre-requisites: -**

**Contact Hours: 14L**

**Course Coordinator: Mrs. Kanya Kumari S**

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## Course Content

### Unit I

#### Introduction to the Constitution of India

Making of the Indian Constitution and its salient features, Preamble of the Constitution, Fundamental Rights and relevant cases.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit II

#### Relevance of Directive Principles of State Policy -Part-IV

Fundamental Duties & their significance.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit III

#### Union executive and State executive

The organs of government -Union executive- the President of India, Vice President, Prime Minister & Council of Ministers. The Union Legislature, Compositions & the functions of Parliament and the Supreme court of India -composition & Jurisdictions State executive-Governor, Chief Minister& council of Ministers, State legislature-composition & functions of legislative assembly& legislative council and State Judiciary.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit IV

#### Emergency provisions and Special constitutional provisions in India

Emergency provisions, kinds effects and proclamation of emergencies

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit V

#### Electoral process & Major Constitutional Amendments

Election commission of India & Electoral process, Amendment procedure and Major Constitutional amendments.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Text Book:

1. A Primer on Constitution of India & Professional ethics, VTU Publication-2007

## Reference Books:

1. Durga Das Basu,- 'Introduction to Constitution of India'- 19<sup>th</sup>/20<sup>th</sup> edition 2001
2. M.V.Pylee.- ' An Introduction to Constitution of India, 4<sup>th</sup> edition, 2008
3. Dr. K. R. Phaneesh,- 'Constitution of India & Professional ethics' - Sudha publication, Tenth revised edition 2018.

## Course Outcomes (COs):

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

1. Identify the fundamental principles of Indian constitution.(PO-12)
2. Examine various provisions of the Directive principles of state policies and fundamental duties .(PO-6,PO-12)
3. Understand the powers & functions of executive, Legislature and judicial system at the center and state level. ( PO-6, PO-12)
4. Identify the role of government. (PO-12)
5. Understand about basic Human rights in India (PO-6, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment	10	CO1, CO2
quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

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# DESIGN THINKING

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Course Code: AECC17/27

Credits: 2:0:0

Pre-requisites: Nil

Contact Hours: 28L

Course Coordinators: Dr. Christina Grace, Dr.Prabha Ravi

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## Course Content

### Unit I

**Introduction:** Introduction to Design Thinking, Design and Business, Design Thinking for Education, Design Thinking Mindsets: Six Key Mindsets, Other Mindsets for Success

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Link: <https://www.youtube.com/watch?v=dAWwFG3X6u0>,
- <https://www.davidleedtech.org/>

### Unit II

**The Design Thinking Process:** The Design Thinking Process, The Five Phases of Design Thinking: Empathize Phase, Self- Awareness and Partnerships, Interviews, Observations, Immersion, Research, Empathy Map, Projects, Define Phase, Synthesis: Finding Needs and Insights, Problem Statement, “How Might We” Question.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Link: <https://www.youtube.com/watch?v=5CUt2QQsJfc>

### Unit III

**Ideate Phase and Prototyping:** Ideate Phase, Demystifying Creativity, Innovation, and Originality, Ideate Principles, Pre- Brainstorming: Mindset, Warm-Ups, and Practice, Prototype Phase, Rapid Prototyping, Prototyping in Action, Facilitation and Mentorship, Makerspace, Tools, and Materials.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Links: <https://youtu.be/M66ZU2PCiM>

### Unit IV

**Testing Phase, Product life cycle and Value engineering:** Test Phase, Embracing Failure, Testing with End Users, Testing without End Users, Iteration; Product life cycle (Development, Introduction, Growth, Maturity, Decline), Value Engineering Job Plan, Case study on value engineering

- Pedagogy/Course delivery tools: Chalk and Talk, Powerpoint presentation, Videos
- Links: <https://youtube.com/watch?v=qgVs8vskWl0&feature=shares>  
[https://youtube.com/watch?v=85\\_Eet4o9QM&feature=shares](https://youtube.com/watch?v=85_Eet4o9QM&feature=shares)  
<https://youtube.com/watch?v=CkezCE3GmeQ&feature=shares>



## Unit V

**Case studies:** Case studies from YouTube: Amul and its innovation during pandemic, Asian Paints growth strategy, Prototype of smart village, Futuristic farms, Data driven design,

Case study from Jeanne Liedtka et al book: Redesigning the Customer Contact Center at Toyota, Rethinking Subsidized Meals for the Elderly at The Good Kitchen

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation
- Link: <https://youtu.be/nnwqtZiYMxQ>  
<https://youtu.be/jGT6ob8hV6M>  
<https://youtu.be/SlhE4--7lEM>  
<https://youtu.be/KfB2sx9uCkI>  
<https://youtu.be/Jh5xKbuvMIA>

### Text Book:

1. David Lee, Design Thinking in the Classroom, Ulysses Press, Korea, 2018

### Reference Books:

1. Jeanne Liedtka, Andrew King, Kevin Bennett - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover –2013
2. Roger Martin - The Design of Business: Why Design Thinking is the Next Competitive Advantage, Harvard Business Press, 2009.
3. Idris Mootee - Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School, John Wiley & Sons 2013.

### Web links and Video Lectures (e-Resources):

1. Stanford: Design Thinking [www.youtube.com/watch?v=GeUXQ\\_L-35M&feature=shares](http://www.youtube.com/watch?v=GeUXQ_L-35M&feature=shares)
2. Design thinking workshop: [www.youtube.com/channel/UCOjS4V\\_nBkylZ-pnlJFMJnTw](http://www.youtube.com/channel/UCOjS4V_nBkylZ-pnlJFMJnTw)
3. Design Thinking HBR [www.youtube.com/watch?v=z3IbHLfeyWo](http://www.youtube.com/watch?v=z3IbHLfeyWo)
4. Design Thinking: Solving Life's Problems [www.youtube.com/watch?v=UQYoWwHg3qA](http://www.youtube.com/watch?v=UQYoWwHg3qA)

### Course Outcomes (COs):

On successful completion of the course, students will be able to

1. Understand design thinking (PO-2, PO-6)
2. Understand and initiate design thinking process (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)
3. Generate and develop design ideas and prototype (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)
4. Test and analyse failures (PO-2, PO-4, PO-6)
5. Learn how Design Thinking can be applied (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment MCQ Quiz Presentation Model/Mini project Any other (Casestudy/ group activity with report writing	20	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Descriptive five units - internal choice unit wise	100 (scale downing to 50 marks)	CO1, CO2, CO3, CO4, CO5

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# COMPUTER AIDED ENGINEERING DRAWING LABORATORY

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Course Code: MELC28

Credits: 0:1:1

Pre-requisites: -

Contact Hours: 14T+14P

Course Coordinator: Dr. Mohandas K N

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## Course Contents

### Course Learning Objectives:

1. To understand the basic and applied engineering drawings solutions by using suitable software.
2. To comprehend the criticality of development of typical lateral surfaces.
3. To visualize typical engineering components.

### Teaching-Learning (General Instructions):

- Students should be made aware of powerful engineering communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

## Unit I

### Introduction:

Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D environment. 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:

Orthographic projections: Definitions - Planes of projection, reference line and conventions employed, Projections of points in First and Third quadrants (**No problems**), Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (**No problems**). Orthographic Projections of Planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (**Placed in First quadrant only using change of position method**).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Orthographic Projections: <https://youtu.be/uePTMVQIIA4>
- Links: Orthographic projections of plane: <https://www.youtube.com/watch?v=GguSUMNxc8Q>

## Unit II

### Development of Lateral Surfaces of Solids:

Development of sectioned (**Section plane perpendicular to VP and inclined to HP bisecting the axis only**) lateral surfaces of right regular prism, cylinder, pyramid and cone resting **with base on HP only**.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Development of lateral surfaces: [https://www.youtube.com/watch?v=U5mz9\\_W-xdl](https://www.youtube.com/watch?v=U5mz9_W-xdl)

## Unit III

### Orthographic Projection of Solids:

Orthographic projection of right regular solids (**Solids Resting on HP only**): Prism & Pyramid (triangle, square, rectangle, pentagon, hexagon), Cylinder, Cone and Cube (No freely suspended problems).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Orthographic Projection of Solids: <https://youtu.be/-sUEGrynfJ0>

## Unit IV

### Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prism, pyramid, cylinder, cone, sphere and frustum of solid. Isometric projection of combination of two simple solids (**Co-axial only**).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Isometric Projection: <https://youtu.be/Vo9LC9d7FQA>

## Unit V

**Multidisciplinary Applications & Practice:** (For CIE only)

**Free hand Sketching:** True free hand, Guided Free hand, Roads.

**Drawing Simple Mechanisms:** Bicycles, Tricycles, Gear trains.

**Electric Wiring and lighting diagrams:** Like, Automatic fire alarm using suitable software

**Basic Building Drawing:** Architectural floor plan, basic foundation drawing using suitable software.

**Electronics Engineering Drawings:** Simple Electronics Circuit Drawings, practice on layers concept

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Free hand sketching: <https://www.youtube.com/watch?v=Ess0dmJB2lo>
- Links: Electric wiring and lighting diagram: <https://www.youtube.com/watch?v=c67wIH2IJL8>
- Links: Electronics Engineering Drawings: <https://www.youtube.com/watch?v=RpF7oFC-LPY>

### **Course Outcomes (COs):**

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

1. Demonstrate the usage of suitable software for creating basic and applied engineering drawings.
2. Conceptually sketch and draw developments for typical lateral surfaces.
3. Exhibit the knowledge of orthographic and isometric projections of typical solids.

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## ENGINEERING CHEMISTRY LABORATORY

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Course Code: CYLC29

Credits: 0:0:1

Pre-requisites: -

Contact Hours: 14P

Course Coordinators: Dr. Nagaraju Kottam & Dr. MN Manjunatha

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### Course Contents

#### **PART A: Any Five (choice based) - Instrumental**

1. Estimation of copper present in electroplating effluent by optical sensor (Colorimetrically).
2. Estimation of acid mixture (HCl & CH<sub>3</sub>COOH) by conductometric method.
3. Analysis of iron content present in E-waste effluent by potentiometrically.
4. Determination of pKa of vinegar using pH sensor (Membrane electrode - Glass electrode).
5. Estimation of sodium present in soil/an effluent sample using flame photometer.
6. Determination of Viscosity Coefficient of a lubricant sample (Ostwald's Viscometer).

#### **PART B: Any Five (choice-based)-Volumetric and other Techniques**

1. Assessment of suitability of drinking and industrial water by estimation of total hardness by EDTA method.
2. Determination of COD of an industrial effluent sample.
3. Estimation of percentage of iron in rust solution.
4. Estimation of copper in electroplating effluent sample iodometrically.
5. Synthesis of semiconducting metal oxide (ZnO/Fe<sub>2</sub>O<sub>3</sub>/CuO) nanomaterial.
6. Determination of rate of corrosion of mild steel by weight loss method.

#### **PART C: (Demo Experiments)**

1. Verification of Nernst's equation and measurement of single electrode potential.
2. Chemical structure drawing using software: ACD/ChemSketch.
3. Analysis of cement by volumetric method
4. Synthesis of Urea-Formaldehyde polymer.
5. Preparation of a conducting polymer.

### **Suggested Learning Resources:**

#### **Reference books:**

1. Vogel's quantitative Chemical Analysis, Pearson Publication, 6<sup>th</sup> Edition, 2009.

2. Chemistry for Environmental Engineering, 5<sup>th</sup> Edition, Clair N. Sawyer and Perry L, Mc. Carty; Mc. Graw-Hill Book Company, New York, 2003.
3. Chemistry Manual – RIT, 2022-23

### Web links and Video Lectures (e-Resources):

1. <http://msrit.edu/study-material/chemistry.html>

### Course Outcomes (COs):

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

1. Handle the apparatus in chemical laboratories for analysis of various materials (PO-1, PO-2, PO-7).
2. Analyze the suitability of water for domestic and industrial consumption (PO-1, PO-2, PO-7).
3. Synthesis of nano structured semiconducting and polymeric materials and evaluate the content and composition of new materials encountered in engineering applications (PO-1, PO-2, PO-7).

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Weekly evaluation of laboratory manuals/records after the	30	CO1, CO2, CO3
Practical test	20	CO1, CO2, CO3
<b>Semester End Examination (SEE)</b>		
Semester end examination (Two experiments, 3 hours)	50	CO1, CO2, CO3

**CIVIL ENGINEERING STREAM  
II SEMESTER**



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# MULTIVARIATE CALCULUS & DIFFERENTIAL EQUATIONS

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Course Code: MAV21

Credits: 2:1:1

Pre-requisites: -

Contact Hours: 28L+14T+14P

Course Coordinator: Dr. M V Govindaraju

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## Course Contents

### Unit I

**Differential Calculus - II:** Taylor's series and Maclaurin's series expansion of one variable (without proof) and its applications to solve algebraic and transcendental equations - Newton-Raphson method. Taylor's series and Maclaurin's series expansion of two variables (without proof) and its applications to solve the system of nonlinear equations - Newton-Raphson method. Maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/106/111106101/>  
<https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>  
<https://a.impartus.com/ilc/#/course/619570/1030>

### Unit II

**First order and first degree linear differential equations:** First order and first degree ODEs to solve LR, RC circuits, Newton's law of cooling and orthogonal trajectories.

**Numerical solution of first order ODE:** Taylor's series method, Euler's & modified Euler's method, fourth order Runge-Kutta method.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/106/111106100/>  
<https://nptel.ac.in/courses/111/106/111106101/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>  
<https://a.impartus.com/ilc/#/course/619570/1030>

### Unit III

**Linear differential equations of higher Order:** Linear differential equations of higher order with constant coefficients. Cauchy's and Legendre's linear differential equations, Method of variation of parameters – Engineering applications.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>

## Unit IV

**Finite Differences and Interpolation:** Forward and backward differences, Interpolation, Newton-Gregory forward and backward interpolation formulae, Lagrange's interpolation formula and Newton's divided difference interpolation formula (no proof).

**Numerical Differentiation and Numerical Integration:** Derivatives using Newton-Gregory forward and backward interpolation formulae, Newton-Cotes Quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8th rule.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://a.impartus.com/ilc/#!/course/96127/452>  
<https://a.impartus.com/ilc/#!/course/132243/636>  
<https://a.impartus.com/ilc/#!/course/119635/593>
- Impartus recording: <https://nptel.ac.in/courses/111/105/111105134/>  
<https://nptel.ac.in/courses/111/106/111106101/>

## Unit V

**Partial differential equations:** Introduction to PDE, Solutions of partial differential equations – direct integration method, Lagrange's method and method of separation of variables.

**Solution of PDE's using Finite difference method:** Classification of second order PDE, Solution of one dimensional heat equation using Schmidt method, one dimensional wave equation using explicit method. Solution of two dimensional Laplace equation.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/101/111101153/>
- Impartus recording: <https://a.impartus.com/ilc/#!/course/290290/703>  
<https://a.impartus.com/ilc/#!/course/171951/703>

### Text Book:

1. **George B. Thomas, Maurice D. Weir, Joel R. Hass** - Thomas' Calculus, Pearson, 13<sup>th</sup> edition, 2014.
2. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> edition, 2017

### Reference Books:

1. **Erwin Kreyszig** - Advanced Engineering Mathematics, Wiley publication, 10<sup>th</sup> edition, 2015.
2. **Peter V. O' Neil** – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7<sup>th</sup> edition, 2011.
3. **Glyn James & Phil Dyke** – Advanced Modern Engineering Mathematics, Pearson Education, 5<sup>th</sup> edition, 2018.
4. **Srimanta Pal & Subobh C Bhunia** - Engineering Mathematics, Oxford University Press, 3<sup>rd</sup> Reprint, 2016

## Course Outcomes (COs):

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

1. Determine extreme values, roots of algebraic & transcendental equations and solution of nonlinear system of equations. (PO-1, PO-2)
2. Solve first order differential equations analytically and numerically. (PO-1, PO-2)
3. Solve higher order linear differential equations with constant and variable coefficients. (PO-1, PO-2)
4. Find the solution of PDE's analytically and numerically. (PO-1, PO-2)
5. Find functional values, derivatives, areas and volumes numerically from a given data. (PO-1, PO-2)

## List of Laboratory experiments

1. Numerical solution of the given algebraic/transcendental equation using Newton-Raphson method
2. Numerical solution of the given system of non-linear equation using Newton-Raphson method
3. Numerical solution of the given first order IVP using modified Euler's method, fourth order Runge-Kutta method
4. Constructions of Orthogonal trajectories for a given family of curves
5. Analytical/numerical solution of higher order IVP and BVP
6. Numerical differentiation of given data set by interpolation technique
7. Numerical Integration of given data set by interpolation technique
8. Numerical solution of Heat equation
9. Numerical solution of Wave equation
10. Numerical solution of Laplace equation

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE) 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Conducting Experiment and Laboratory Record	15	CO1, CO2, CO3, CO4, CO5
Lab Test	05	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer any one question from each unit – Internal choice)	100	CO1, CO2, CO3, CO4, CO5

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# ENGINEERING CHEMISTRY

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Course Code: CYV22

Credits: 3:0:0

Pre-requisites: -

Contact Hours: 42L

Course Coordinators: Dr. B M Nagabhushana & Dr. Nagaraju Kottam

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## Course Contents

### Unit I

#### Chemical Energy Conversion and Battery Technology

**Chemical Energy Conversion:** Basic concepts of electrochemistry – electrode potential, origin of single electrode potential, Galvanic cells. Derivation of Nernst equation, Reference electrodes – calomel electrode, measurement of single electrode potential using saturated calomel electrode. Concentration cells. Numerical problems on electrode potential, EMF of cells and concentration cells.

**Battery Technology:** Basic concepts. Mechanism of battery operation, battery characteristics. Classification of batteries – Primary, secondary and reserve batteries. Modern batteries: construction, working and applications of Nickel-Metal hydride battery, Li-ion (Lithium batteries).

**Self-Study:** New generation Batteries: Introduction and Example- Al-air batteries.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component / Practical Topics: Potentiometric titration using calomel & platinum electrode assembly. Determination of electrode potential of unknown metal using Nernst equation
- Links: Impartus video lectures: <http://msrit.edu/study-material/chemistry.html>

### Unit II

#### Corrosion Science and Engineering

**Corrosion Science and Engineering:** Metallic corrosion - Definition, electrochemical theory of corrosion. Types of corrosion - Differential metal corrosion, differential aeration corrosion (Ex: pitting and waterline corrosion) and Stress corrosion. Factors affecting the rate of corrosion.

**Corrosion control Methods:** Chemical Methods: Inorganic coatings- anodizing and phosphating. Corrosion inhibitors. Physical Methods: Cathodic Protection-sacrificial anode method. Metal coating- Anodic and cathodic metal coatings with examples.

**Self-Study:** Multifunctional coatings (Thermal resistance, photo resistance and scratch resistance).

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component / Practical Topics: Analysis of iron content in steel solution by external indicator method.
- Links: Impartus videos:<http://msrit.edu/study-material/chemistry.html>

## Unit III

### Nanomaterials and Analytical Techniques

**Nanomaterials:** Introduction to nanomaterials. Synthesis: top-down and bottom-up approaches. Chemical methods of synthesis- solution combustion and hydrothermal methods. Characterization techniques like PXRD, SEM, and TEM (only mention & introduction). Applications of nanomaterials.

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

**Self-Study:** Technological applications of oxide nano materials.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos
- Lab component / Practical Topics: Synthesis of nanomaterials by wet chemical methods, Determination of pH, Estimation of metals by colorimeter.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit IV

### Water Quality Analysis

**Water Quality Analysis:** Hardness – definition, types of hardness and its determination by EDTA method – numerical problems. Determination of dissolved (DO) oxygen by Winkler’s method. Biological Oxygen Demand (BOD)–definition, determination and numerical problems. Chemical Oxygen Demand (COD) – Definition, determination and numerical problems. Determination of nitrate using phenol disulphonic acid (spectrophotometric method). Potable water – Definition. Membrane based Technology for water purification: purification of water by reverse osmosis.

**Self-Study:** Recycling of waste water physical, chemical and biological systems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component / Practical Topics: Determination of total hardness, COD of waste water, Estimation of copper by colorimetric method and measurement of conductivity of electrolytes
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Unit V

### Polymer Science and Coatings

**Polymer Science:** Introduction to high polymers. Glass transition temperature (T<sub>g</sub>), factors influencing T<sub>g</sub>. Conducting polymers - Definition, mechanism of conduction in polyacetylene. High performance (Engineering) polymers: Synthesis, properties and applications of Teflon and PMMA.

**Coatings:** Introduction, composition, different types of Paints and their application in construction (Anti-Corrosive Paints, Cement Based Paints, Silicate Paints). Varnishes, Epoxy resins. Types of emulsions and their chemical properties.

**Self-Study:** Advances coating materials.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Links: Impartus videos: <http://msrit.edu/study-material/chemistry.html>

## Suggested Learning Resources:

### Text Book:

1. P. C. Jain and Monica Jain, A text Book of Engineering Chemistry, Dhanapat Rai Publications, New Delhi, 17<sup>th</sup> Edition, 2018.
2. R.V. Gadag and Nithyananda Shetty, A text Book of Engineering Chemistry. Medtech Publishers.1<sup>st</sup> Edition 2019.

### Reference Books:

1. F.W. Billmeyer, 'Text Book of Polymer Science', John Wiley & Sons, 4<sup>th</sup> Edition, 2007.
2. M.G. Fontana, N. D. Greene, 'Corrosion Engineering', McGraw Hill Publications, New York, 3<sup>rd</sup> Edition, 2005.
3. 'Principles of Physical Chemistry' B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 48<sup>th</sup> Edition 2019.
4. G.A.Ozin and A.C. Arsenault, "Nanotechnology: A Chemical approach to Nanomaterials", RSC Publishing, 2005.
5. 'Liquid Crystals' by S. Chandrashekar, Cambridge University Press, 2<sup>nd</sup> Edition, 2010
6. 'Introduction to Liquid Crystals' by Peter J. Collings. CRC Press, 2<sup>nd</sup> edition, 2019.

### Web links and Video Lectures (e-Resources):

1. <http://msrit.edu/study-material/chemistry.html>
2. <https://nptel.ac.in/courses/122/101/122101001/>

### Course Outcomes (COs):

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

1. Apply the knowledge of electrochemistry to improve the efficiency of batteries. (PO-1, PO-2, PO-7).
2. Interpret the reasons of corrosion, monitor and control by using the proper techniques. (PO-1, PO-2, PO-7).
3. Apply the knowledge in synthesis, structural elucidation of nanomaterials and sensors as analytical techniques for different applications (PO-1, PO-2, PO-7).
4. Analyze the water samples and will have the knowledge to obtain potable water using different techniques. (PO-1, PO-2, PO-7).
5. Apply the knowledge in synthesis of advanced polymers, conducting polymers and various coatings for different applications. (PO-1, PO-2, PO-7).

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30	CO1,CO2,CO3
Internal test-II	30	CO3,CO4,CO5
Average of the two internal tests will be taken for 30 marks.		
Other components:		
Assignment	10	CO1,CO2,CO3,CO4,CO5
Quiz/MCQ	10	CO1,CO2,CO3,CO4,CO5
Average of the two Assignment/quiz will be taken for 20 marks		
<b>Semester End Examination (SEE)</b>		
Semester end examination (Answer any one question from each unit– Internal choice)	100	CO1,CO2,CO3,CO4,CO5

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## PROFESSIONAL WRITING SKILLS IN ENGLISH

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Course Code: HSCC15/25

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L+14P

Course Coordinators: Dr. Pramila Swamy D & Dr. Udayakumar H M

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### Course Contents

#### Unit I

##### Identifying Common Errors in Writing and Speaking English

Identifying common errors while using the parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord rules), Identifying common errors in usage of Subject-verb agreement and tenses

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill English Language.
- Links: Communication skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit II

##### Nature and Style of Sensible writing

Principles of formal writing, Building introduction, key points and conclusion, Importance of proper punctuation, Usage of connectives, Precise writing, Essay writing, words commonly confused/misused

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill.

#### Unit III

##### Technical Reading and Writing Practices

Introduction to technical writing, Report writing, Significance of reports, types of Reports, Introduction to Technical Proposal writing, Types of Technical Proposals, Characteristics of Technical Proposals, Grammar- Voices and Reported speech.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component: English Language Lab – Lanquill English Language Software – Grammar Exercises
- Links: Communication: <https://academicguides.waldenu.edu/writingcenter/grammar/subjectverbagreement>  
[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)



## Unit IV

### Professional Communication for Employment

Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills, Reading Comprehension, Tips for effective reading, Job Application, Drafting effective resume/curriculum vitae, writing formal Email.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Reading & Writing Exercise

## Unit V

### Professional Communication Skills at Workplace

Intra and Interpersonal communication skills at workplace, Significance of non-verbal communication Group Discussion and Presentation skills, strategies for effective GD, and Presentation skills, Interview skills.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation.
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Presentation and GD Exercises.  
[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

### Text Books:

1. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press India Pvt Ltd- 2019.
2. Meenakshi Raman & Sangeetha Sharma - Technical communication – Principles and Practice Oxford University Press – 2007.
3. A.J. Thomson & A. V. Martinet, A Practical English Grammar, Oxford University Press –1987.

### Reference Books:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education (India) Private Limited-2005.
2. Dr. Premila D Swamy & Udayakumar H M, Communication skills for Engineers, Archers and Elevators Publishing House Bangalore, India, 2021.
3. S K. Khandelwal & R K Gupta, Functional Grammar & Composition, Laxmi Publication (P) Ltd.
4. N. Krishna Murthy, Modern English Grammar, Trinity press, 2016.
5. John Seely - The Oxford Guide to Effective Writing and Speaking. OUP, 2005.
6. Oxford Advanced Learners's Dictionary, 8th edition, 2013.
7. Martin Hewings - Advanced Grammar in Use, Cambridge University Press, 2013.

### Course Outcomes (COs):

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

1. Understand and identify the common errors in writing and speaking English. (PO-9, PO-10, PO-12)
2. Understand nuances of writing and enhance writing skills (PO-10, PO-12)
3. Learn and draft technical reports and writing. (PO-10, PO-12)
4. Use appropriate professional communication and writing practices. (PO-9, PO-10, PO-12)
5. Apply suitable presentation techniques in workplace environment. (PO-9, PO-10, PO-12)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30 (6 marks objective & 24 marks subjective pattern)	CO1,CO2,CO3
Internal test-II	30 (6 marks objective & 24 marks subjective pattern)	CO3,CO4,CO5
Average of the two internal tests will be taken for 30 marks.		
<b>Other components</b>		
Assignment-I	10	CO1, CO2, CO3
Assignment-II	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 (10 marks objective & 40 marks subjective pattern)	CO1,CO2,CO3,CO4,CO5

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# CONSTITUTION OF INDIA

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**Course Code: HSCC16/26**

**Credits: 1:0:0**

**Pre-requisites: -**

**Contact Hours: 14L**

**Course Coordinator: Mrs. Kanya Kumari S**

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## Course Contents

### Unit I

#### **Introduction to the Constitution of India**

Making of the Indian Constitution and its salient features, Preamble of the Constitution, Fundamental Rights and relevant cases.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit II

#### **Relevance of Directive Principles of State Policy -part-IV**

Fundamental Duties & their significance.

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

### Unit III

#### **Union executive and State executive**

The organs of government -Union executive- the President of India, Vice President, Prime Minister & Council of Ministers. The Union Legislature, Compositions & the functions of Parliament and the Supreme court of India -composition & Jurisdictions State executive-Governor, Chief Minister& council of Ministers, State legislature-composition & functions of legislative assembly& legislative council and State Judiciary.

- Pedagogy / Course delivery tools: Chalk and Talk, power point presentation

### Unit IV

#### **Emergency provisions and Special constitutional provisions in India.**

Emergency provisions, kinds effects and proclamation of emergencies

- Pedagogy / Course delivery tools: Chalk and Talk, power point presentation

### Unit V

#### **Electoral process & Major Constitutional Amendments**

Election commission of India & Electoral process, Amendment procedure and Major Constitutional amendments.

- Pedagogy / Course delivery tools: Chalk and Talk, power point presentation

## Text Books:

1. A Primer on Constitution of India & Professional ethics, VTU Publication-2007

## Reference Books:

1. Durga Das Basu,- ' Introduction to Constitution of India' - 19th/20th edition 2001
2. M.V.Pylee.- ' An Introduction to Constitution of India, 4th edition, 2008
3. Dr. K. R. Phaneesh,- 'Constitution of India & Professional ethics' –Sudha publication, Tenth revised edition 2018.

## Course Outcomes (COs):

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

1. Identify the fundamental principles of Indian constitution.(PO-12)
2. Examine various provisions of the Directive principles of state policies and fundamental duties .(PO-6,PO-12)
3. Understand the powers & functions of executive, Legislature and judicial system at the center and state level. ( PO-6, PO-12)
4. Identify the role of government. (PO-12)
5. Understand about basic Human rights in India (PO-6, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30	CO1,CO2,CO3
Internal test-II	30	CO3,CO4,CO5
Average of the two internal tests will be taken for 30 marks.		
Other components		
Assignment	10	CO1, CO2
quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1,CO2,CO3,CO4,CO5

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## DESIGN THINKING

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Course Code: AECC17/27

Credits: 2:0:0

Pre-requisites: Nil

Contact Hours: 28L

Course Coordinators: Dr. Christina Grace, Dr. Prabha Ravi

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### Course Content

#### Unit I

**Introduction:** Introduction to Design Thinking, Design and Business, Design Thinking for Education, Design Thinking Mindsets: Six Key Mindsets, Other Mindsets for Success

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Link: <https://www.youtube.com/watch?v=dAWwFG3X6u0>,
- <https://www.davidleedtech.org/>

#### Unit II

**The Design Thinking Process:** The Design Thinking Process, The Five Phases of Design Thinking: Empathize Phase, Self- Awareness and Partnerships, Interviews, Observations, Immersion, Research, Empathy Map, Projects, Define Phase, Synthesis: Finding Needs and Insights, Problem Statement, “How Might We” Question.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Link: <https://www.youtube.com/watch?v=5CUt2QQsJfc>

#### Unit III

**Ideate Phase and Prototyping:** Ideate Phase, Demystifying Creativity, Innovation, and Originality, Ideate Principles, Pre- Brainstorming: Mindset, Warm-Ups, and Practice, Prototype Phase, Rapid Prototyping, Prototyping in Action, Facilitation and Mentorship, Makerspace, Tools, and Materials.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation, Videos
- Links: <https://youtu.be/M66ZU2PClM>

#### Unit IV

**Testing Phase, Product life cycle and Value engineering:** Test Phase, Embracing Failure, Testing with End Users, Testing without End Users, Iteration; Product life cycle (Development, Introduction, Growth, Maturity, Decline), Value Engineering Job Plan, Case study on value engineering

- Pedagogy/Course delivery tools: Chalk and Talk, Powerpoint presentation, Videos
- Links: <https://youtube.com/watch?v=qgVs8vskW10&feature=shares>  
[https://youtube.com/watch?v=85\\_Eet4o9QM&feature=shares](https://youtube.com/watch?v=85_Eet4o9QM&feature=shares)  
<https://youtube.com/watch?v=CkezCE3GmeQ&feature=shares>

## Unit V

**Case studies:** Case studies from YouTube: Amul and its innovation during pandemic, Asian Paints growth strategy, Prototype of smart village, Futuristic farms, Data driven design,

Case study from Jeanne Liedtka et al book: Redesigning the Customer Contact Center at Toyota, Rethinking Subsidized Meals for the Elderly at The Good Kitchen

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation
- Link: <https://youtu.be/nnwqtZiYMxQ>  
<https://youtu.be/jGT6ob8hV6M>  
<https://youtu.be/SlhE4--7IEM>  
<https://youtu.be/KfB2sx9uCkI>  
<https://youtu.be/Jh5xKbuvMIA>

### Text Book:

1. David Lee, Design Thinking in the Classroom, Ulysses Press, Korea, 2018

### Reference Books:

1. Jeanne Liedtka, Andrew King, Kevin Bennett - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover –2013
2. Roger Martin - The Design of Business: Why Design Thinking is the Next Competitive Advantage, Harvard Business Press, 2009.
3. Idris Mootee - Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School, John Wiley & Sons 2013.

### Web links and Video Lectures (e-Resources):

1. Stanford: Design Thinking [www.youtube.com/watch?v=GeUXQ\\_L-35M&feature=shares](http://www.youtube.com/watch?v=GeUXQ_L-35M&feature=shares)
2. Design thinking workshop: [www.youtube.com/channel/UCOjS4V\\_nBkylZ-pnlJFMJnTw](http://www.youtube.com/channel/UCOjS4V_nBkylZ-pnlJFMJnTw)
3. Design Thinking HBR [www.youtube.com/watch?v=z3IbHLfeyWo](http://www.youtube.com/watch?v=z3IbHLfeyWo)
4. Design Thinking: Solving Life's Problems [www.youtube.com/watch?v=UQYoWwHg3qA](http://www.youtube.com/watch?v=UQYoWwHg3qA)

### Course Outcomes (COs):

On successful completion of the course, students will be able to

1. Understand design thinking (PO-2, PO-6)
2. Understand and initiate design thinking process (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)
3. Generate and develop design ideas and prototype (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)
4. Test and analyse failures (PO-2, PO-4, PO-6)
5. Learn how Design Thinking can be applied (PO-2, PO-3, PO-6, PO-9, PO-10, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment MCQ Quiz Presentation Model/Mini project Any other (Casestudy/ group activity with report writing	20	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Descriptive five units - internal choice unit wise	100 (scale downing to 50 marks)	CO1, CO2, CO3, CO4, CO5

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# COMPUTER AIDED ENGINEERING DRAWING LABORATORY

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**Course Code: MELV28**

**Credits: 0:1:1**

**Pre-requisites: -**

**Contact Hours: 14T+14P**

**Course Coordinator: Dr. Mohandas K N**

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## Course Contents

### Course Learning Objectives:

1. To understand the basic and applied engineering drawings solutions by using suitable software.
2. To comprehend the criticality of development of typical lateral surfaces.
3. To visualize typical engineering components.

### Teaching-Learning (General Instructions):

- Students should be made aware of powerful engineering communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

## Unit I

### Introduction:

Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D environment. 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:

Orthographic projections: Definitions - Planes of projection, reference line and conventions employed, Projections of points in First and Third quadrants (**No problems**), Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes (**No problems**). Orthographic Projections of Planes viz triangle, square, rectangle, pentagon, hexagon,



and circular laminae (**Placed in First quadrant only using change of position method**).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Orthographic Projections: <https://youtu.be/uePTMVQIIA4>
- Links: Orthographic projections of plane: <https://www.youtube.com/watch?v=GguSUMNxc8Q>

## Unit II

### Development of Lateral Surfaces of Solids:

Development of sectioned (**Section plane perpendicular to VP and inclined to HP bisecting the axis only**) lateral surfaces of right regular prism, cylinder, pyramid and cone resting **with base on HP only**.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Development of lateral surfaces: [https://www.youtube.com/watch?v=U5mz9\\_W-xdl](https://www.youtube.com/watch?v=U5mz9_W-xdl)

## Unit III

### Orthographic Projection of Solids:

Orthographic projection of right regular solids (**Solids Resting on HP only**): Prism & Pyramid (triangle, square, rectangle, pentagon, hexagon), Cylinder, Cone and Cube (No freely suspended problems).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Orthographic Projection of Solids: <https://youtu.be/-sUEGrynfJ0>

## Unit IV

### Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prism, pyramid, cylinder, cone, sphere and frustum of solid. Isometric projection of combination of two simple solids (**Co-axial only**).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Isometric Projection: <https://youtu.be/Vo9LC9d7FQA>

## Unit V

**Multidisciplinary Applications & Practice:** (For CIE only)

**Free hand Sketching:** True free hand, Guided Free hand, Roads.

**Drawing Simple Mechanisms:** Bicycles, Tricycles, Gear trains.

**Electric Wiring and lighting diagrams:** Like, Automatic fire alarm using suitable software

**Basic Building Drawing:** Architectural floor plan, basic foundation drawing using suitable software.

**Electronics Engineering Drawings:** Simple Electronics Circuit Drawings, practice on layers concept

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation
- Links: Free hand sketching: <https://www.youtube.com/watch?v=Ess0dmJB2lo>
- Links: Electric wiring and lighting diagram: <https://www.youtube.com/watch?v=c67wIH2IJL8>
- Links: Electronics Engineering Drawings: <https://www.youtube.com/watch?v=RpF7oFC-LPY>

## **Course Outcomes (COs):**

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

1. Demonstrate the usage of suitable software for creating basic and applied engineering drawings.
2. Conceptually sketch and draw developments for typical lateral surfaces.
3. Exhibit the knowledge of orthographic and isometric projections of typical solids.

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## ENGINEERING CHEMISTRY LABORATORY

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Course Code: CYLV29

Credits: 0:0:1

Pre-requisites: Nil

Contact Hours: 14P

Course Coordinators: Dr. Nagaraju Kottam & Dr. M N Manjunatha

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### Course Contents

#### PART A: Any Five (choice based) - Instrumental

1. Estimation of copper present in electroplating effluent by optical sensor (Colorimetrically).
2. Estimation of acid mixture (HCl & CH<sub>3</sub>COOH) by conductometric method.
3. Analysis of iron content present in E-waste effluent by potentiometrically.
4. Determination of pK<sub>a</sub> of vinegar using pH sensor (Membrane electrode - Glass electrode).
5. Estimation of sodium present in soil/an effluent sample using flame photometer.
6. Determination of Viscosity Coefficient of a lubricant sample (Ostwald's Viscometer).

#### PART B: Any Five (choice-based)-Volumetric and other Techniques

1. Assessment of suitability of drinking and industrial water by estimation of total hardness by EDTA method.
2. Determination of COD of an industrial effluent sample.
3. Estimation of percentage of iron in rust solution.
4. Estimation of copper in electroplating effluent sample iodometrically.
5. Synthesis of semiconducting metal oxide (ZnO/Fe<sub>2</sub>O<sub>3</sub>/CuO) nanomaterial.
6. Determination of rate of corrosion of mild steel by weight loss method.

#### PART C: (Demo Experiments)

1. Verification of Nernst's equation and measurement of single electrode potential.
2. Chemical structure drawing using software: ACD/ChemSketch.
3. Analysis of cement by volumetric method
4. Synthesis of Urea-Formaldehyde polymer.
5. Preparation of a conducting polymer.

#### Reference books:

1. Vogel's quantitative Chemical Analysis, Pearson Publication, 6<sup>th</sup> Edition, 2009.
2. Chemistry for Environmental Engineering, 5<sup>th</sup> Edition, Clair N. Sawyer and Perry L, Mc. Carty; Mc. Graw-Hill Book Company, New York, 2003.
3. Chemistry Manual – RIT, 2022-23

### Web links and Video Lectures (e-Resources):

1. <http://msrit.edu/study-material/chemistry.html>

### Course Outcomes (COs):

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

1. Handle the apparatus in chemical laboratories for analysis of various materials (PO-1, PO-2, PO-7).
2. Analyze the suitability of water for domestic and industrial consumption (PO-1, PO-2, PO-7).
3. Synthesis of nano structured semiconducting and polymeric materials and evaluate the content and composition of new materials encountered in engineering applications (PO-1, PO-2, PO-7).

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE) : 50</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Weekly evaluation of laboratory manuals/records after the	30	CO1, CO2, CO3
Practical test	20	CO1, CO2, CO3
<b>Semester End Examination (SEE)</b>		
Semester end examination (Two experiments, 3 hours)	50	CO1, CO2, CO3

**ELECTRICAL & ELECTRONICS  
ENGINEERING STREAM  
II SEMESTER**

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# DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

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**Course Code: MAE21**

**Credits: 2:1:1**

**Pre-requisites: -**

**Contact Hours: 28L+14T+14P**

**Course Coordinator: Dr. G Neeraj**

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## Unit I

### Multivariate Calculus

Taylor's series and Maclaurin's series expansion of one variable (without proof), solve algebraic and transcendental equations - Newton-Raphson method.

Taylor's series and Maclaurin's series expansion of two variables (without proof), solve the system of nonlinear equations - Newton-Raphson method. Maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/106/111106101/>  
<https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>  
<https://a.impartus.com/ilc/#/course/619570/1030>

## Unit II

### First order Ordinary Differential Equations

Exact differential equations, Differential equations Reducible to exact. applications of first order and first degree ODEs to solve LR, RC circuits, Newton's law of cooling and orthogonal trajectories.

**Numerical solution of first order ODE:** Taylor's series method, Euler's & modified Euler's method, fourth order Runge- Kutta method.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/106/111106100/>  
<https://nptel.ac.in/courses/111/106/111106101/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>  
<https://a.impartus.com/ilc/#/course/619570/1030>

## Unit III

### Higher Order Linear Ordinary Differential Equations

Linear ordinary differential equations of higher order with constant coefficients, Linear ordinary differential equations of higher order with variable coefficients, Cauchy's and Legendre's linear ordinary differential equations, Method of variation of parameters Initial value problems, boundary value problems.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>  
<https://a.impartus.com/ilc/#/course/59742/295>

## Unit IV

### Beta and Gamma functions and Laplace transforms - I

**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions.

**Laplace Transforms - I :** Existence and Uniqueness of Laplace transforms, transform of elementary functions, Properties–Linearity, Scaling, t-shift property, s-domain shift, differentiation in the s- domain, division by t, differentiation and integration in the time domain, Evaluation of integrals.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/104/111104144/>  
<https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/59742/295>

## Unit V

### Laplace Transforms -II

Laplace transform of Periodic function (square wave, saw-tooth wave, triangular wave, full & half wave rectifier), Heaviside Unit step function, Dirac-Delta function.

**Inverse Laplace Transforms:** Definition, properties, evaluation using different methods, convolution theorem (without proof), and solution ordinary differential equations and Simultaneous linear differential equations, Application to LR, RC & LCR circuits.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Software: MATLAB
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

## Lists of Laboratory experiments

1. Applications to Maxima and Minima of two variables
2. Computing the approximate roots for algebraic and transcendental equations using Newton Raphson method.
3. Construction of orthogonal trajectories for a given family of curves.
4. Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method
5. Solution of ODE of first order and first degree by Runge-Kutta 4th order
6. Analytical and numerical solution of higher order IVP and BVP
7. Evaluation of improper integrals
8. Visualization in time and frequency domain of standard functions.

9. Computing inverse Laplace transform of standard functions.
10. Laplace transform of convolution of two functions

### **Text Books:**

1. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> edition, 2021.
2. **Erwin Kreyszig** –Advanced Engineering Mathematics, Wiley publication, 10<sup>th</sup> edition, 2018.

### **Reference Books:**

1. **B. V. Ramana** - Higher Engineering Mathematics, Tata McGraw-Hill, 11<sup>th</sup> Edition, 2017.
2. **Srimanta Pal & Subodh C Bhunia** - Engineering Mathematics, Oxford University Press, 3<sup>rd</sup> Reprint, 2016.
3. **N.P.Bali and Manish Goyal:** "A textbook of Engineering Mathematics", Laxmi publications ,10<sup>th</sup> edition ,2022.
4. **David C lay,** " Linear Algebra and its Applications" Pearson publishers, 4<sup>th</sup> edition, 2018.

### **Course Outcomes (COs):**

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

1. Determine extreme values, roots of algebraic & transcendental equations and solution of non-linear system of equations. (PO-1, PO-2)
2. Solve first order differential equations analytically and numerically (PO-1, PO-2)
3. Solve higher order linear differential equations with constant and variable coefficients (PO-1, PO-2)
4. Evaluate improper integral and determine Laplace transform of standard functions. (PO-1, PO-2)
5. Solve initial and boundary value problems using Laplace transforms (PO-1, PO-2)



## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests will be taken		
<b>Lab components</b>		
Conducting Experiment and Laboratory Record	15	CO1, CO2, CO3, CO4, CO5
Lab Test	05	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer any one question from each unit – Internal choice)	100	CO1,CO2,CO3,CO4,CO5

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## ENGINEERING PHYSICS

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Course Code: PYE22

Credits: 2:1:0

Pre-requisites: Nil

Contact Hours: 28L+14T

Course Coordinator: Dr. Nagesh B V

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### Course Content

#### Unit I

##### Photonics

**Lasers:** Characteristics of LASER, Interaction of radiation with matter, Expression for energy density equation and its significance, Requisites of a Laser system, Conditions for Laser action, Principle, Construction and working of He-Ne laser, Semiconductor Laser, Application of Lasers – LIDAR, Bridge deflection and Laser Printing, Numerical problems.

**Optical Fibers:** Review of principle and Propagation mechanism in Fibers & TIR, Angle of acceptance, Numerical aperture, fractional index change, Modes of propagation, Number of modes and V parameter, Types of optical fibers, Attenuation and Mention of expression for attenuation coefficient, Applications: Point to point communication discussion with block diagram, Merits and demerits, Numerical problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=YHmGNDMV1cY>

#### Unit II

##### Maxwell's Equations and EM Waves

**Maxwell's Equations:** Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem. Description of laws of electrostatics, magnetism and Faraday's laws of EMI. Current density & equation of Continuity; displacement current (with derivation) Maxwell's equations in vacuum

**EM Waves:** The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane electromagnetic waves in vacuum, their transverse nature, Numerical problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <http://a.impartus.com/ilc/#/course/59743/295>

#### Unit III

##### Quantum Mechanics

de- Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity (Derivation-relation between  $V_p$  &  $V_g$ ), Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus-Relativistic), Principle of Complementarity, Wave Function, Physical Significance of a wave function and Born Interpretation, Time independent

Schrodinger wave equation, Expectation value, Eigen functions and Eigen Values, Motion of a particle in a one dimensional potential well of infinite depth, Waveforms and Probabilities. Numerical Problems

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=h1tflE-L2Dc&list=RDCMUCEikU3T6u6JA0XiHLbNbOw&index=10>

## Unit IV

### Electrical Properties of Materials & Application

**Electrical Conductivity in metals:** Resistivity and Mobility, Concept of Phonon, Matheissen's rule. Quantum free electron theory, Fermi energy, Fermi factor, F-D statistics, Density of states (Qualitative), Expression for EF (Derivation).

**Superconductivity:** Introduction to Superconductors, Temperature dependence of resistivity, Meissner Effect, Critical Current.

**Dielectric Properties:** Polar and non-polar dielectrics, Types of Polarization, internal fields in solid, Clausius- Mossotti equation(Derivation). Application of dielectrics in transformers, Capacitors, Electrical Insulation. Numerical Problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://archive.nptel.ac.in/courses/115/101/115101092>

## Unit V

### Semiconductors and Devices

**Semiconductor and Devices:** Fermi level in intrinsic semiconductors, Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression), Law of mass action, Electrical conductivity of a semiconductor (derivation), Hall effect, Expression for Hall coefficient (derivation) and its application. Photodiode and Power responsivity, Four probe method to determine resistivity, solar cell. Numerical problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://archive.nptel.ac.in/courses/115/101/115101092>

### Text Books:

1. **M.N. Avadhanulu and P.G. Kshirsagar:** A Text book of Engineering Physics, 10<sup>th</sup> revised Ed, S.Chand & Company Ltd, New Delhi
2. **Gaur and Gupta:** Engineering Physics, Dhanpat Rai Publishers, New Delhi, 8<sup>th</sup> revised edition 2017.
3. **S O Pillai:** Solid State Physics, 8<sup>th</sup> Ed- New Age International Publishers-2018.

### Reference Books:

1. **Resnick, Halliday and Jearl Walker** - Fundamentals of Physics, John Wiley & Sons, Inc., 11th edition, 2018.
2. **Kenneth S.Krane**- Modern Physics, Wiley-India- 3rd Edition, 2019.
3. **David Griffith:** Introduction to Electrodynamics, 4th Edition, Cambridge University press 2017

## Course Outcomes (COs):

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

1. Enumerate the principles of Photonic devices and their application relevant to civil engineering. (PO-1, PO-2, PO-12)
2. Apply the laws of electricity & magnetism, obtain Maxwell's equations in vacuum. (PO-1, PO-2, PO-12)
3. Distinguish between phase and group velocities; solve Schrödinger's time independent wave equation for the case of infinite potential well. (PO-1, PO-2, PO-12)
4. Apply the quantum theory to understand the electrical conductivity of metals and superconductivity. (PO-1, PO-2, PO-12)
5. Describe the fundamental principles of Hall effect and applications of semiconductor devices. (PO-1, PO-2, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Assignment/Mini Project	10	CO1, CO2, CO3, CO4, CO5
Quiz/Presentations	10	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

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## COMMUNICATIVE ENGLISH

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**Course Code: HSCP15/25**

**Credits: 1:0:0**

**Pre-requisites: Nil**

**Contact Hours: 14L+14P**

**Course Coordinators: Dr. Pramila Swamy D & Dr. Udayakumar H M**

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### Course Content

#### Unit I

##### Fundamentals of Communication

Introduction and fundamentals of Communication, Process of communication, Barriers to effective communication, Different types of communication, Interpersonal and Intrapersonal communication skills, 7C's of communication.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill English Language Software – Body Language, Verbal & Nonverbal Communication.
- Links: Communication skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit II

##### Introduction to Phonetics

Introduction to Phonetics, English Pronunciation, Introduction to consonants, vowels, Syllables and structure, Word stress and Intonation in English language.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach.
- Lab component: English Language Lab – Lanquill English Language Software – Phonetics, Speaking & Listening activities.
- Links: Listening & Speaking Skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit III

##### Basic English Grammar and Vocabulary: Part I

Parts of Speech, Articles and Preposition, Question Tags, Idioms and Phrases, Vocabulary-Synonyms, Antonyms, Homonyms, Homophones, and Homographs.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component: English Language Lab – Lanquill English Language Software – Grammar Exercises
- Links: Grammar: <https://academicguides.waldenu.edu/writingcenter/grammar/subjectverbagreement>[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

## Unit IV

### Basic English Grammar and Vocabulary: Part II

Word formation- Prefixes and Suffixes, Compound words, Contractions and Abbreviations, Tenses and Types of tenses, Rules in tense usage and Exercises on it.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Vocabulary, Reading & Writing Exercises.

## Unit V

### Communication Skills for Employment

Information Transfer: Oral Presentation and its Practice, Guidelines for Extempore/ Public Speaking, Mother Tongue Influence (MTI), Various Techniques for neutralization of Mother Tongue influence, Reading and Listening Comprehensions-Exercises

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: Technical Writing: English Language Lab – Lanquill English Language Software – Reading & Listening Exercises.
- Links: Resume: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

### Course Outcomes (COs):

on successful completion of the course students will be able to

1. Understand and apply the fundamentals of communication in English. (PO 9, PO10, PO12)
2. Identify the nuances of phonetics, intonation and enhance English pronunciation. (PO10, PO12)
3. Use correct grammar and vocabulary in everyday communication. (PO10, PO12)
4. Apply correct grammar, vocabulary and enhance communicative competency. (PO9, PO10, PO12)
5. Apply the techniques of information transfer through presentation. (PO9, PO10, PO12)

### Text Books:

1. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press India Pvt Ltd- 2019.
2. Meenakshi Raman & Sangeetha Sharma - Technical communication – Principles and Practice Oxford University Press – 2007.
3. A.J. Thomson & A. V. Martinet, A Practical English Grammar, Oxford University Press –1987.

## Reference Books:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education (India) Private Limited-2005.
2. Dr. Premila D Swamy & Udayakumar H M, Communication skills for Engineers, Archers and Elevators Publishing House Bangalore, India, 2021.
3. S K. Khandelwal & R K Gupta, Functional Grammar & Composition, Laxmi Publication (P) Ltd.
4. N. Krishna Murthy, Modern English Grammar, Trinity press, 2016.
5. John Seely - The Oxford Guide to Effective Writing and Speaking. OUP, 2005.
6. Oxford Advanced Learners's Dictionary, 8th edition, 2013.
7. Martin Hewings - Advanced Grammar in Use, Cambridge University Press, 2013.

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30 (6 marks objective & 24 marks subjective pattern)	CO1, CO2, CO3
Internal Test-II	30 (6 marks objective & 24 marks subjective pattern)	CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other components</b>		
Assignment-I	10	CO1, CO2, CO3
Assignment-II	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 (10 marks objective & 40 marks subjective pattern)	CO1, CO2, CO3, CO4, CO5

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## KANNADA KALI

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Course Code: HSCP16/26K

Credits: 1:0:0

Pre-requisites: -

Contact Hours: 14L

Course Coordinator: Mrs. Kanya Kumari S

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### Course Content

#### Unit I

##### (Parichaya) - Introduction

Kannada Bhashe - About Kannada Language, Kannada – JnanpiTh Awardies  
Introduction to Kannada Language, Karnataka State and Literature .

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Unit II

**Kannada PadagaLu mattu VaakyagalU. Kannada Words and Sentences**  
naamapadagaLu – Sarva naamapadagaLu – (Nouns-Pronouns) and it's usage in  
Kannada

Kannada naamavisheshanagaLu - (Adjectives-Interrogatives)

kriyapadagaLu, kriya visheshaNagaLu- (verb-adverb)

Sambhashaneyalli Prashnarthaka padagalU –vaakyagaLu mattu kriyapadagaLu-  
visheshaNagaLu (Kannada- Interrogative words & Sentences and verb-adverb in  
Conversation)

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Unit III

##### **Kannada akshara maale(Kannada alphabets and their practices with pronunciations)**

swaraaksharagaLu –vyanjanaksharagaLu- gunitaksharagaLu, tantragnana mattu  
AaDalita padagaLu-Technical and administrative worlds in Kannada

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation

#### Unit IV

##### **Kannada padagaLu (eakavachana,bahuvachanagaLu,viruddha padagaLu dina nityadalli baLasuva padagaLu mattu sankya vyavaste**

Sambhashaneyalli Eakavachana mattu Bhahuvachana- (Singular and Plural nouns)  
Viruddha padagalU /Virodharthaka padagalU (Antonyms) Asamanjasa Uchcharane  
(Inappropriate Pronunciation)

Sankhya Vyavasthe(Numbers system) -Samaya /Kalakke Sambhandhisida padhagalU  
(Words Relating to time) – Dikkugalige sambhadhisida padhagalU (Words Relating to  
Directions)



Aaharakke sambandisida padagaLu(Names connected with food)  
Manavana shareerada bhagagalu / angagalu (Parts of the Human body) Manava Sambhandhada da padhagalu (Terms Relating to Human Relationship)  
Manavana Bhavanegalige sambandisida Padagalu (Words Relating to Human's feelings and Emotions)  
Vaasada staLakke sambhandisidanthaha padhagalu (Words Relating to place of leaving)

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations

## Unit V

### **Kannada Bhasheyalli Sambhashanegalu- Conversations in Kannada**

Samanya Sambhashaneyalli Kannadada Padagalu mattu Vaakyagalu.  
(Kannada Words and Sentences in General Conversation with activities)  
(Conversation in Shop, Hostel, Market, Bus and Train)  
Shabdakosha: Vocabulary – chaTuvaTike: Exercises  
Vicharaneya / Bedikeya vakyagalu(Enquiry /Request sentences in Conversation)  
Shabdakosha – Vocabulary - Exercises to test their knowledge of understanding the Language.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations

### **Text Book:**

1. Dr.L.Thimmesh., Prof. Keshava muurthy, 'BaLake kannada' prasarangaa, VTU,2020

### **Reference Books:**

1. **Smt. KanyaKumari.S** –'Kannada Kali ' Kinnari publications' First edition, Bengaluru,2022
2. **Lingadevaru Halemane** – 'Kannada Kali', Prasaranga kannada University Hampi, 6<sup>th</sup> Edition. 2019

### **Course Outcomes (COs):**

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

1. Develop vocabulary (PO-10)
2. Identify the basic Kannada language skill(PO-10)
3. Develop listing & speaking skill in Kannada language. (PO-6, PO-12)
4. Enrich language skill. (PO-12)
5. Apply Kannada language skill for various purpose(PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

## ಕನ್ನಡ ಮನಸು

Course Code: HSCP16/26M

Credits: 1:0:0

Pre-requisites: -

Contact Hours: 14L

Course Coordinator: Mrs. Kanya Kumari S

### ಘಟಕ 1 (Unit I)

#### ಲೇಖನಗಳು (Articles) – ಕಾವ್ಯಭಾಗ (poetry)

ಕನ್ನಡ ಭಾಷೆ ನಾಡು – ನುಡಿ

ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ

ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ

ವಚನಗಳು-ಅಕ್ಕಮಹಾದೇವಿ-ಬಸವಣ್ಣ-ಅಲ್ಲಮಪ್ರಭು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 2 (Unit II)

#### ಕೀರ್ತನೆ ಮತ್ತು ತತ್ವ ಪದಗಳು

ಪುರಂದರ ದಾಸರು

ಶಿಶುನಾಳ ಶರೀಫರು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 3 (Unit III)

#### ಆಧುನಿಕ ಕಾವ್ಯಗಳು

ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ

ಕುರುಡು ಕಾಂಚಾಣ

ಚೋಮನ ಮಕ್ಕಳ ಹಾಡು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 4 (Unit IV)

#### ತಾಂತ್ರಿಕ ಧುರೀಣರು( ವ್ಯಕ್ತಿ ಪರಿಚಯ) ಕಥೆ-ಪ್ರವಾಸ ಕಥನ

ಡಾ.ಸರ್.ಎಂ.ವಿಶ್ವೇಶ್ವರಯ - ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ.ಎನ್.ಮೂರ್ತಿರಾಯರು

ಯುಗಾದಿ - ವಸುಧೇಂದ್ರ

ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ - ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 5 (Unit V)

ಕರಕುಶಲ ಕಲೆಗಳು ತಾಂತ್ರಿಕ ವಿಜ್ಞಾನ (technical science )

ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆ ವಿಜ್ಞಾನ- ಕರಿಗೌಡ ಬೇಟನ ಹಳ್ಳಿ

ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ-

ಕ ಮತ್ತು ಬ ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕಂಪ್ಯೂಟರ್ ಮುಖಾಂತರ ಕನ್ನಡ ಟೈಪಿಂಗ್ ತಾಂತ್ರಿಕ ಪದಕೋಶ ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

## ಪಠ್ಯ ಪುಸ್ತಕ (Text book):

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ'

ಸಂಪಾದಕರು:

ಡಾ.ಹಿ.ಜಿ, ಬೋರಲಿಂಗಯ್ಯ -ವಿಶ್ರಾಂತ ಕುಲಪತಿಗಳು, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ ,ಹಂಪಿ,ಪ್ರಸಾರಂಗ

ವಿಶ್ವೇಶ್ವರಯ್ಯತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ,ಬೆಳಗಾವಿ,ಪ್ರಥಮ ಮುದ್ರಣ-2020

ಪೂರಕ ಪಠ್ಯ (reference book) ಕನ್ನಡ ಮನಸು, ಪ್ರಸಾರಂಗ - ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ-ಹಂಪಿ, ಆರನೇಮುದ್ರಣ 2016

## ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡದ ಜೊತೆಗೆ ಕ್ರಿಯಾತ್ಮಕ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಡು-ನುಡಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು (PO-6)
- ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣ, ಭಾಷಾರಚನೆ ಯ ನಿಯಮಗಳನ್ನು ಪರಿಚಯಿಸುವುದು (PO-10)
- ಕನ್ನಡ ಭಾಷಾಬರಹದಲ್ಲಿ ಕಂಡು ಬರುವ ದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ (PO-10)
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು , ಸರ್ಕಾರಿ ಹಾಗೂ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು (PO-12)
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. (PO-12)

## Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	Marks	Course outcomes attained
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
Other components		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

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## A SCIENTIFIC APPROACH TO HEALTH

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Course Code: AECP17/27

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L

Course Coordinator: Dr. Anita Kanavalli

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### Course Content

#### Unit I

##### **Good Health and its balance for positive mindset (2 lecture hours)**

Health- its importance, factors, beliefs and behaviour, Good health benefits, Health and Society, Health and family, Health and Personality, Health and behaviour, Disparities of health in different vulnerable groups. Health and psychology, Methods to improve good psychological health. Psychological disorders (Stress and Health – Stress management), Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for YouTube videos/ Animation videos: [https://www.youtube.com/watch?v=71\\_NkXgAK1g](https://www.youtube.com/watch?v=71_NkXgAK1g)
- <https://www.youtube.com/watch?v=mwuahwbIBnE>

#### Unit II

##### **Building of healthy lifestyles for better future (3 lecture hours)**

Role of diet for good health, Food and health, Nutritional guidelines for good health and wellbeingness, Obesity and overweight disorders and its management, Eating disorders-proper exercises for its maintenance (Physical activities or health),Fitness components for health, Wellness and physical function.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos: <https://www.youtube.com/watch?v=c06dTj0v0sM>  
<https://www.youtube.com/watch?v=Y8HIFRPU6pM>

#### Unit III

##### **Creation of Healthy and caring relationships (3 lecture hours)**

Building communication skills (Listening and speaking),Friends and friendship -education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life(more than a biology),Changing health behaviours through social engineering.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos: <https://www.youtube.com/watch?v=IwZIFG-3Y4o>  
<https://www.youtube.com/watch?v=rzEI6ZVmGW8>

## Unit IV

### Avoiding risks and harmful habits (3 lecture hours)

Characteristics of health compromising behaviors, addictions -recognizing and avoiding, addictive behaviors, Types of addictions, influencing factors for addictions, Differences between addictive people and non addictive people and their behavior with society, Effects and health hazards from addictions.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos: [https://www.youtube.com/watch?v=S-12Zj\\_JIRQ](https://www.youtube.com/watch?v=S-12Zj_JIRQ)
- <https://www.youtube.com/watch?v=OnFVFfAImEg>

## Unit IV

### Preventing and fighting against diseases for good health (3 lecture hours)

Occurrence of infections and reasons, protection from different types of transmitted infections, Current trends of socioeconomic impact, Reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life, Health and Wellness of youth, Measuring of health and wealth status.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos: <https://www.youtube.com/watch?v=X0OxrsgAP2w>
- <https://www.youtube.com/watch?v=Ap1FXfy91d4>

### Text Book/s:

1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor –Published by Routledge 711 Third Avenue, New York, NY10017.
2. Health Psychology A Textbook, (Fourth Edition) by Jane Ogden McGraw-Hill Education (India) Private Limited- Open University Press

### Reference Books:

1. Health Psychology (Ninth Edition) by SHELLEYE. TAYLOR-University of California, Los Angeles , McGraw-Hill Education(India)Private Limited- Open University Press
2. Scientific Foundations of Health (Health & Wellness)- General Books published for university and colleges references by popular authors and published by the reputed publisher.

### Video Lectures:

1. SWAYAM/NPTL/MOOCs/Weblinks/Internetsources/YouTubevideosandothermaterials/notes.

## Course Outcomes (COs):

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

1. Demonstrate the skills to live a healthy life and be a part of a healthy community. (PO-6, PO-7)
2. Learn how to use their stream of study towards sustainable living. (PO-7, PO-8)
3. Demonstrate the knowledge as a gateway for exchange of innovative thinking contributing to healthy individual and community. (PO-8, PO-9)
4. Learn to cultivate psycho-social behavioral quality. (PO-9, PO-10)
5. Understand the importance of science and scientific applications to enhance health.(PO-10, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
MCQ /Casestudy/group activity with report writing	20	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
90 minutes (02 Hours duration).	50	CO1, CO2, CO3, CO4, CO5

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# ELEMENTS OF ELECTRICAL ENGINEERING

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Course Code: EEE28

Credits: 2:1:0

Pre-requisites: -

Contact Hours: 28L+14T

Course Coordinators: Dr. Nagaraj C

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## Course Content

### Unit I

#### Introduction to Electrical Power

Generation, transmission and distribution of electrical power. Comparison of AC and DC systems. Concept of grid and need for interconnection of grids. Conditions for grid connection. Integration of renewable energy sources to grid- conditions and benefits. Types of loads. Concept of power and energy. Definition of Power Factor. Tariff structures and calculations.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for power generation, transmission distribution and Tariff: <http://www.nptelvideos.in/2012/11/power-sys-generation-transmission.html>

### Unit II

#### Analysis of DC and AC Circuits

Fundamentals of AC and DC waveforms, representation of AC and DC quantities, average and rms values, form factor, peak factor. Electric circuit analysis using Ohms law and Kirchoff's laws. Current and Voltage division rule. Analysis of DC circuits. Analysis of single phase AC circuits with R, L, C, RL, RC and RLC series and parallel configuration, Numericals.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for AC and DC waveform: <https://www.youtube.com/watch?v=vN9aR2wKv0U>
- Link for Generation of sine wave: <https://www.youtube.com/watch?v=gQyamjPrw-U>

### Unit III

#### Introduction to Electrical Machines-I

Faraday's laws. Static and dynamically induced EMF. Construction and working principle of DC Machine. DC Generator EMF equation. DC Motor Characteristics and applications. Necessity of starter, Numericals. Construction and working principle of single phase transformer. EMF equation and losses in transformer, Numericals.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for DC Generator: [https://www.youtube.com/watch?v=d\\_LOXUEFA-o](https://www.youtube.com/watch?v=d_LOXUEFA-o)
- Link for Transformer: [https://www.youtube.com/watch?v=vh\\_aCAHThTQ](https://www.youtube.com/watch?v=vh_aCAHThTQ)



## Unit IV

### Introduction to Electrical Machines-II

Advantages of three phase circuits. Relation between line and phase quantities in STAR and DELTA connected systems. Construction and working principle of Synchronous Generator, EMF equation, Numericals. Types of Induction motors and applications. Construction and working principle of three phase Induction Motor (Rotating magnetic field), slip, slip speed and frequency of rotor EMF, Numericals.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for Alternator: <https://www.youtube.com/watch?v=tiKH48EMgKE>
- Link for 3-Phase Induction Motor: [https://www.youtube.com/watch?v=AQqyG-NOP\\_3o](https://www.youtube.com/watch?v=AQqyG-NOP_3o)
- <https://www.youtube.com/watch?v=Mle-ZvYi8HA>

## Unit V

### Introduction to Special Machines

BLDC Motor and Stepper Motor advantages, disadvantages and applications.

Introduction to Wiring and Lighting:

Types of domestic wiring, types of lamps and its applications.

Protection and Safety of Electrical Systems:

Fuse, MCB, ELCB, surge protective devices and Relay. Necessity of earthing, difference between earthing and grounding and types of grounding. Electric shocks, hazards and safety precautions.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for BLDC motor: <https://www.youtube.com/watch?v=bCEiOnuODac>
- Link for MCB: <https://www.youtube.com/watch?v=9Xgn40eGcqY>
- Link for Stepper Motor: <https://www.youtube.com/watch?v=eyqwLiowZiU>

### Text Book/s:

1. D. C. Kulshreshtha - Basic Electrical Engineering, McGraw Hill, 2009.
2. K Venkataratnam – Special Electrical Machines, Universities Press, 2014

### Reference Book/s:

1. D. P. Kothari and I. J. Nagrath - Basic Electrical Engineering, Tata McGraw Hill, 2010.
2. V K Mehta, Principles of Power Systems, 2006

### Web links for video lectures(e-Resources):

1. <https://nptel.ac.in/courses/108/108/108108076/>
2. <https://a.impartus.com/ilc/#/course/59745/295>

### Course Outcomes (COs):

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

1. Interpret the concepts of Electrical Power (PO-1)
2. Solve problems in DC and AC circuits (PO-1)
3. Exemplify the concepts of Electrical Machines (PO-1)
4. Explain the types of wiring and lighting systems (PO-1)
5. Identify types of protective systems and safety precautions (PO-1, PO-6)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment	10	CO4, CO5
Quiz	10	CO2, CO3
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer one question from each unit- internal choice)	100	CO1,CO2,CO3,CO4, CO5

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## BASIC ELECTRONICS

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**Course Code:** BEE28

**Credits:** 2:1:0

**Pre-requisites:** -

**Contact Hours:** 28L+14T

**Course Coordinator:** Veena G N

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### Course Content

#### Unit I

**Semiconductor Diodes and Applications:** P-N junction diode, DC equivalent circuits, DC load line analysis of Diode with numerical, Half-Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Capacitor filter circuit, Zener diode voltage regulators (with no load and loaded regulator), Types of Diodes: LED, Varactor diode, Tunnel diode, Photo diode, Schottky diode.

- Pedagogy / Course delivery tools: Chalk and talk, Videos.
- Links: DC load line analysis of Diode: <https://www.youtube.com/watch?v=TaTGn-bxIMdY>  
<https://nptel.ac.in/courses/117/103/117103063/>  
<https://a.impartus.com/ilc/#/course/80947/295>  
<https://a.impartus.com/ilc/#/course/119642/593>

#### Unit II

**Bipolar Junction Transistors:** BJT & its Configurations, Common Emitter Characteristics, (Numerical examples as applicable)

**BJT Biasing:** DC load line and bias point, Fixed bias & Voltage divider bias (Accurate) (Numerical examples as applicable)

**AC analysis of BJT Circuits:** Common emitter circuit analysis (Qualitative analysis only)

- Pedagogy / Course delivery tools: Chalk and talk, Videos.
- Links: voltage divider biasing: <https://www.youtube.com/watch?v=VKr9SB3cULc>  
<https://nptel.ac.in/courses/117/103/117103063/>  
<https://a.impartus.com/ilc/#/course/80947/295>  
<https://a.impartus.com/ilc/#/course/119642/593>

#### Unit III

**Op-Amp:** Ideal Op-Amp, Basic Op-amp circuits: Inverting amplifier, Non Inverting amplifier, Voltage Follower, Summer, Subtractor, Integrator, Differentiator. (Numerical examples as applicable)

**Field Effect Transistors:** Junction Field effect transistors (JFET), JFET characteristics and parameters, Metal Oxide Semiconductor Field Effect Transistors (MOSFETs): Depletion and Enhancement MOSFET, Complementary Metal Oxide Semiconductor (CMOS).

- Pedagogy / Course delivery tools: Chalk and talk, Videos.
- Links: JFET characteristics: <https://www.youtube.com/watch?v=Dd4im8TMAk0>  
<https://nptel.ac.in/courses/117/103/117103063/>  
<https://a.impartus.com/ilc/#/course/80947/295>  
<https://a.impartus.com/ilc/#/course/119642/593>

## Unit IV

**Fundamentals of Digital Electronics:** Number Systems and Conversions: Decimal, Binary, Octal and Hexadecimal. Binary Arithmetic: Addition & Subtraction (1s & 2s Complement method).

**Boolean Algebra:** Theorems, De Morgan's theorem, Digital Circuits: Logic gates, NOT, AND, OR, XOR, NAND, NOR and X-NOR gates. Algebraic simplification, NAND and NOR implementation, Half adder, Full adder.

**Flip Flops:** Introduction to Latch & Flip-Flops, NAND gate latch/ NOR gate latch, SR Flip-Flop.

- Pedagogy / Course delivery tools: Chalk and talk, Videos.
- Links: NAND and NOR implementation: <https://www.youtube.com/watch?v=-F2ATq6HYHpY&t=303s>
- <https://www.youtube.com/watch?v=F2ATq6HYHpY>

## Unit V

**Sensor Applications:** Introduction to Transducer, Classification of Transducer – Passive Electrical Transducers: Resistive Transducers, LVDT, Active Electrical Transducers: Piezoelectric Transducer, Photoelectric Transducer.

**Applications:** Block diagram of analog and digital communication systems, Digital TV system, Satellite communication, Principle of operations of Mobile phone.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation, Videos.
- Links: Transducer: <https://www.youtube.com/watch?v=aFdWzYyZ2Gg>

## Suggested Learning Resources:

### Text Books:

1. David. A. Bell – Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008.
2. D. P. Kothari, I. J. Nagrath – Basic Electronics, 2nd Edition, McGraw Hill Education (India) Private Limited, 2014.

### Reference Books:

1. H S Kalsi – Electronic Instrumentation and Measurements, McGraw Hill Education, 4th Edition, 2019.
2. George Kennedy, Bernard Davis, S. R. M Prasanna – Electronic Communication Systems, McGraw Hill Education, 6th Edition, 2017.

## **Course Outcomes (COs):**

On successful completion of the course students will be able to

1. Describe semiconductor devices and its applications (PO-1, PO-2, PO-3, PO-8, PO-9, PO-12)
2. Analyze the various circuits of BJT. (PO-1, PO-2, PO-3, PO-8, PO-9, PO-12)
3. Employ Op-Amp in various circuits. (PO-1, PO-2, PO-3, PO-8, PO-9, PO-12)
4. Analyze digital circuits. (PO-1, PO-2, PO-3, PO-8, PO-9, PO-12)
5. Appreciate the importance of transducers and communication system. (PO-1, PO-8, PO-9, PO-12)

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## ENGINEERING PHYSICS LABORATORY

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**Course Code: PYLE29**

**Credits: 0:0:1**

**Pre-requisites: Nil**

**Contact Hours: 14P**

**Course Coordinator: Dr. G N Anil kumar**

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### Course Content

1. General Instructions and Introduction to Error Analysis.
2. Plotting of forward and reverse bias characteristics of a Zener Diode and determination of breakdown voltage.
3. Determination of numerical aperture, Acceptance angle and bending loss in Optical Fibre Cable.
4. Measurement of capacitance and dielectric constant of a capacitor by charging and discharging it through a resistor.
5. Calculation of Planck's constant using LEDs.
6. Verification of Stefan's law
7. Identification of different components (L,C or R) of a Black Box and calculation of their values through frequency response curves.
8. Determination of Moment of inertia of an irregular body and rigidity modulus of the material of the suspension wire using torsional oscillations.
9. Determination of Young's Modulus of the material of the single cantilever beam.
10. Determination of Energy gap of semiconductor.
11. Determination of Fermi energy of a metal.
12. Measurement of operating wavelength of semiconductor laser using Laser diffraction.
13. Calculation of thickness of given paper strip by the method of interference fringes (Air wedge).
14. Frequency response of series and parallel LCR circuits and calculation of Q-factor and band width.
15. Determination of Hall coefficient and concentration of charge carriers of the semiconductor.
16. Simulation of electrical experiments using Pspice

Students are required to perform 12 prescribed experiments (from 2 to 16) in the above list. Cyclic order will be followed.

### Reference Books:

1. Laboratory manual prepared by the Physics department, RIT, Bangalore

## Suggested Learning e-Resources (Web links and Video Lectures)

1. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
2. <https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html>
3. [https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)
4. <https://phet.colorado.edu>
5. <https://www.myphysicslab.com>

## Course Outcomes (COs):

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

1. Determine elastic constants of material using torsion pendulum and cantilever. (PO-1, PO-4)
2. Apply the concepts of interference and diffraction of light to determine thickness of thin films and wavelength of light. (PO-1, PO-4)
3. Construct and analyze simple AC and DC circuits to determine electrical parameters, familiarity with the concepts of modern Physics. (PO-1, PO-4, PO-5)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Weekly evaluation of laboratory journals/ reports after the conduction of every experiment.	30	CO1, CO2, CO3
Practical test	20	CO1, CO2, CO3
<b>Semester End Examination (SEE)</b>		
Semester end Examination	50	CO1, CO2, CO3

# **MECHANICAL ENGINEERING STREAM II SEMESTER**



# MULTIVARIATE CALCULUS & DIFFERENTIAL EQUATIONS

Course Code: MAM21

Credits: 2:1:1

Pre-requisites: -

Contact Hours: 28L+14T+14P

Course Coordinator: Dr. M V Govindaraju

## Course Content

### Unit I

**Differential Calculus - II:** Taylor's series and Maclaurin's series expansion of one variable (without proof) and its applications to solve algebraic and transcendental equations - Newton-Raphson method. Taylor's series and Maclaurin's series expansion of two variables (without proof) and its applications to solve the system of nonlinear equations - Newton-Raphson method. Maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/106/111106101/>  
<https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>  
<https://a.impartus.com/ilc/#/course/619570/1030>

### Unit II

**First order and first degree linear differential equations:** First order and first degree ODEs to solve LR, RC circuits, Newton's law of cooling and orthogonal trajectories.

**Numerical solution of first order ODE:** Taylor's series method, Euler's & modified Euler's method, fourth order Runge-Kutta method.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/106/111106100/>  
<https://nptel.ac.in/courses/111/106/111106101/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>  
<https://a.impartus.com/ilc/#/course/619570/1030>

### Unit III

**Linear differential equations of higher Order:** Linear differential equations of higher order with constant coefficients. Cauchy's and Legendre's linear differential equations, Method of variation of parameters – Engineering applications.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/119640/593>  
<https://a.impartus.com/ilc/#/course/59742/295>

## Unit IV

**Finite Differences and Interpolation:** Forward and backward differences, Interpolation, Newton-Gregory forward and backward interpolation formulae, Lagrange's interpolation formula and Newton's divided difference interpolation formula (no proof).

**Numerical Differentiation and Numerical Integration:** Derivatives using Newton-Gregory forward and backward interpolation formulae, Newton-Cotes Quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8th rule.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://a.impartus.com/ilc/#/course/96127/452>  
<https://a.impartus.com/ilc/#/course/132243/636>  
<https://a.impartus.com/ilc/#/course/119635/593>
- Impartus recording: <https://nptel.ac.in/courses/111/105/111105134/>  
<https://nptel.ac.in/courses/111/106/111106101/>

## Unit V

**Partial differential equations:** Introduction to PDE, Solutions of partial differential equations – direct integration method, Lagrange's method and method of separation of variables.

**Solution of PDE's using Finite difference method:** Classification of second order PDE, Solution of one dimensional heat equation using Schmidt method, one dimensional wave equation using explicit method. Solution of two dimensional Laplace equation.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation, Videos
- Links: <https://nptel.ac.in/courses/111/101/111101153/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/290290/703>  
<https://a.impartus.com/ilc/#/course/171951/703>

### Text Books:

1. **George B. Thomas, Maurice D. Weir, Joel R. Hass** - Thomas' Calculus, Pearson, 13th edition, 2014.
2. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44th edition, 2017

### Reference Books:

1. **Erwin Kreyszig** – Advanced Engineering Mathematics, Wiley publication, 10th edition, 2015.
2. **Peter V. O'Neil** – Advanced Engineering Mathematics, Thomson Brooks/Cole, 7th edition, 2011.
3. **Glyn James & Phil Dyke** – Advanced Modern Engineering Mathematics, Pearson Education, 5th edition, 2018.
4. **Srimanta Pal & Subobh C Bhunia** - Engineering Mathematics, Oxford University Press, 3rd Reprint, 2016

### Course Outcomes (COs):

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

1. Determine extreme values, roots of algebraic & transcendental equations and solution of nonlinear system of equations. (PO-1, PO-2)
2. Solve first order differential equations analytically and numerically. (PO-1, PO-2)
3. Solve higher order linear differential equations with constant and variable coefficients. (PO-1, PO-2)
4. Find the solution of PDE's analytically and numerically. (PO-1, PO-2)
5. Find functional values, derivatives, areas and volumes numerically from a given data. (PO-1, PO-2)

## **List of Laboratory experiments**

1. Numerical solution of the given algebraic/transcendental equation using Newton-Raphson method
2. Numerical solution of the given system of non-linear equation using Newton-Raphson method
3. Numerical solution of the given first order IVP using modified Euler's method, fourth order Runge-Kutta method
4. Constructions of Orthogonal trajectories for a given family of curves
5. Analytical/numerical solution of higher order IVP and BVP
6. Numerical differentiation of given data set by interpolation technique
7. Numerical Integration of given data set by interpolation technique
8. Numerical solution of Heat equation
9. Numerical solution of Wave equation
10. Numerical solution of Laplace equation

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal test shall be taken		
<b>Lab components</b>		
Conducting Experiment and Laboratory Record	15	CO1, CO2, CO3, CO4, CO5
Lab Test	05	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer any one question from each unit – Internal choice)	100	CO1, CO2, CO3, CO4, CO5

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## ENGINEERING PHYSICS

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**Course Code: PYM22**

**Credits: 2:1:0**

**Pre-requisites: Nil**

**Contact Hours: 28L+14T**

**Course Coordinator: Dr. Kalpana Sharma**

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### Course Content

#### Unit I

##### Elasticity and Oscillations

Elasticity: Basics of elasticity—Types of Elastic Moduli — Poisson's ratio— Torsion of a cylinder and determination of couple per unit twist—Torsion pendulum— Determination of rigidity modulus using torsion pendulum --Bending moment of a beam (qualitative) – Cantilever loaded at free end.

Vibrations: Introduction — Analysis of under damped vibrations, over and critical damping (qualitative) —logarithmic decrement and quality factor—Forced vibrations and Resonance —LCR circuits and electrical resonance (only qualitative).

Numerical problems

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=QHMzFUo0NL8>

#### Unit II

##### Quantum Mechanics

de- Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity(Derivation-relation between  $V_p$  &  $V_g$  ), Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus-Relativistic), Principle of Complementarity, Wave Function, Physical Significance of a wave function and Born Interpretation, Time independent Schrodinger wave equation, Expectation value, Eigen functions and Eigen Values, Motion of a particle in a one dimensional potential well of infinite depth , Waveforms and Probabilities. Numerical Problems

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=h1fIE-L2Dc&list=RDCCEikU3T6u6JA0XiHLbNbOw&index=10>

#### Unit III

##### Thermoelectric Materials and Devices

Thermo emf and thermo current, Seeback effect, Peltier effect, Seeback and Peltier coefficients, figure of merit (Mention Expression), laws of thermoelectricity. Expression for thermo emf in terms of  $T_1$  and  $T_2$ , Thermo couples, thermopile, Construction and Working of Thermoelectric generators (TEG) and Thermoelectric coolers (TEC), low, mid and high temperature thermoelectric materials, Applications: Exhaust of Automobiles, Refrigerator, Space Program (RTG), Numerical Problems

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=2w7NBuu5w9c&list=PLtkeUZItwH-K5y6qy1GFxa4Z4RcmzUaaz6>

## **Unit IV**

### **Cryogenics**

Production of low temperature - Joule Thomson effect (Derivation with 3 cases), Porous plug experiment with theory, Thermodynamical analysis of Joule Thomson effect, Liquefaction of Oxygen by cascade process, Linde's air liquefier, Liquefaction of Helium and its properties, Platinum Resistance Thermometer, Applications of cryogenics, in aerospace, Tribology and food processing(qualitative), Numerical Problems

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: <https://www.youtube.com/watch?v=fHBPvMDFyO8>

## **Unit V**

### **Materials Science**

Material Characterization and Instrumentation Techniques: Introduction to Nano materials: Size effects: Quantum confinement, High surface area to volume ratio, Bragg's law, 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), Transmission electron microscopy (TEM), Numerical Problems.

- Pedagogy / Course delivery tools: Chalk and talk, Power point presentation.
- Links: [https://www.youtube.com/channel/UCSQIEd4W\\_loJWv\\_uJ2dfQw](https://www.youtube.com/channel/UCSQIEd4W_loJWv_uJ2dfQw)

### **Text Books:**

1. Gaur and Gupta: Engineering Physics, Dhanpat Rai Publishers, New Delhi, 8th revised edition 2017.
2. P.K. Mitra-Characterization of Materials- Prentice Hall India Learning Private Limited.
3. M.N. Avadhanulu and P.G. Kshirsagar: A Text book of Engineering Physics, 10th revised Ed, S.Chand & Company Ltd, New Delhi

### **Reference Books:**

- Resnick, Halliday and Jearl Walker - Fundamentals of Physics, John Wiley & Sons, Inc., 11th edition, 2018.
- Bahman Zohuri-Physics of Cryogenics by, Elsevier, 2018
- Chintoo S Kumar, K Takayama and K P J Reddy-Shock waves made simple, Willey India Pvt. Ltd, Delhi 2014.

## Course Outcomes (COs):

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

1. Elucidate the concepts in elasticity, different types of oscillations, Resonance and its Engineering Applications. (PO-1, PO-2, PO-12)
2. Distinguish between phase and group velocities; solve Schrödinger's time independent wave equation for the case of infinite potential well. (PO-1, PO-2, PO-12)
3. Apply the principles of Thermoelectric materials & devices in engineering applications. (PO-1, PO-2, PO-12)
4. Enumerate the concepts of liquefaction of gases and applications of cryogenics. (PO-1, PO-2, PO-12)
5. Analyze material properties using different Instrumentation techniques such as XRD, AFM, SEM. (PO-1, PO-2, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Assignment/Mini Project	10	CO1, CO2, CO3, CO4, CO5
Quiz/Presentations	10	CO1, CO2, CO3, CO4, CO5
<b>Semester-End Examination (SEE)</b>	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

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## COMMUNICATIVE ENGLISH

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**Course Code:** HSCP15/25

**Credits:** 1:0:0

**Pre-requisites:** Nil

**Contact Hours:** 14L+14P

**Course Coordinators:** Dr.Premila Swamy D & Dr.Udayakumar H M

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### Course Content

#### Unit I

##### Fundamentals of Communication

Introduction and fundamentals of Communication, Process of communication, Barriers to effective communication, Different types of communication, Interpersonal and Intrapersonal communication skills, 7C's of communication.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Videos.
- Lab component: English Language Lab – Lanquill English Language Software – Body Language, Verbal & Nonverbal Communication.
- Links: Communication skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit II

##### Introduction to Phonetics

Introduction to Phonetics, English Pronunciation, Introduction to consonants, vowels, Syllables and structure, Word stress and Intonation in English language.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach.
- Lab component: English Language Lab – Lanquill English Language Software – Phonetics, Speaking & Listening activities.
- Links: Listening & Speaking Skills: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

#### Unit III

##### Basic English Grammar and Vocabulary: Part I

Parts of Speech, Articles and Preposition, Question Tags, Idioms and Phrases, Vocabulary-Synonyms, Antonyms, Homonyms, Homophones, and Homographs.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component: English Language Lab – Lanquill English Language Software – Grammar Exercises
- Links: Grammar: <https://academicguides.waldenu.edu/writingcenter/grammar/subjectverbagreement>[www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)



## Unit IV

### Basic English Grammar and Vocabulary: Part II

Word formation- Prefixes and Suffixes, Compound words, Contractions and Abbreviations, Tenses and Types of tenses, Rules in tense usage and Exercises on it.

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: English Language Lab – Lanquill English Language Software – Vocabulary, Reading & Writing Exercises.

## Unit V

### Communication Skills for Employment

Information Transfer: Oral Presentation and its Practice, Guidelines for Extempore/ Public Speaking, Mother Tongue Influence (MTI), Various Techniques for neutralization of Mother Tongue influence, Reading and Listening Comprehensions-Exercises

- Pedagogy / Course delivery tools: Task based Teaching learning, Classroom sharing, Power point presentation, Electric Approach
- Lab component / Practical Topics: Technical Writing: English Language Lab – Lanquill English Language Software – Reading & Listening Exercises.
- Links: Resume: [www.bbcenglishlearning.com](http://www.bbcenglishlearning.com)

### Course Outcomes (COs):

on successful completion of the course students will be able to

1. Understand and apply the fundamentals of communication in English. (PO-9, PO-10, PO-12)
2. Identify the nuances of phonetics, intonation and enhance English pronunciation. (PO-10, PO-12)
3. Use correct grammar and vocabulary in everyday communication. (PO-10, PO-12)
4. Apply correct grammar, vocabulary and enhance communicative competency. (PO-9, PO-10, PO-12)
5. Apply the techniques of information transfer through presentation. (PO-9, PO-10, PO-12)

### Text Books:

1. Sanjay Kumar & Pushp Lata, Communication Skills, Oxford University Press India Pvt Ltd- 2019.
2. Meenakshi Raman & Sangeetha Sharma - Technical communication – Principles and Practice Oxford University Press – 2007.
3. A.J. Thomson & A. V. Martinet, A Practical English Grammar, Oxford University Press –1987.

## Reference Books:

1. M Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education (India) Private Limited-2005.
2. Dr. Premila D Swamy & Udayakumar.HM, Communication skills for Engineers, Archers and Elevators Publishing House Bangalore, India, 2021.
3. S K. Khandelwal & R K Gupta, Functional Grammar & Composition, Laxmi Publication (P) Ltd.
4. N. Krishna Murthy, Modern English Grammar, Trinity press, 2016.
5. John Seely - The Oxford Guide to Effective Writing and Speaking. OUP, 2005.
6. Oxford Advanced Learners's Dictionary, 8th edition, 2013.
7. Martin Hewings - Advanced Grammar in Use, Cambridge University Press, 2013.

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30 (6 marks objective & 24 marks subjective pattern)	CO1, CO2, CO3
Internal Test-II	30 (6 marks objective & 24 marks subjective pattern)	CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other components</b>		
Assignment-I	10	CO1, CO2, CO3
Assignment-II	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 (10 marks objective & 40 marks subjective pattern)	CO1, CO2, CO3, CO4, CO5

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## KANNADA KALI

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Course Code: HSCP16/26K

Credits: 1:0:0

Pre-requisites: -

Contact Hours: 14L

Course Coordinator: Mrs. Kanya Kumari S

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### Course Content

#### Unit I

##### (Parichaya) - Introduction

Kannada Bhashe - About Kannada Language, Kannada – JnanpiTh Awardies  
Introduction to Kannada Language, Karnataka State and Literature .

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Unit II

##### Kannada PadagaLu mattu VaakyagalU. Kannada Words and Sentences

naamapadagaLu – Sarva naamapadagaLu – (Nouns-Pronouns) and it's usage in  
Kannada

Kannada naamavisheshanagaLu - (Adjectives-Interrogatives)

kriyapadagaLu, kriya visheshaNagaLu- (verb-adverb)

Sambhashaneyalli Prashnarthaka padagalU –vaakyagaLu mattu kriyapadagaLu-  
visheshaNagaLu (Kannada- Interrogative words & Sentences and verb-adverb in  
Conversation)

- Pedagogy/Course delivery tools: Chalk and Talk, power point presentation

#### Unit III

##### Kannada akshara maale(Kannada alphabets and their practices with pronunciations)

swaraaksharagaLu –vyanjanaksharagaLu- gunitaksharagaLu, tantragnana mattu  
AaDalita padagaLu-Technical and administrative worlds in Kannada

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentation

#### Unit IV

##### Kannada padagaLu (eakavachana,bahuvachanagaLu,viruddha padagaLu dina nityadalli baLasuva padagaLu mattu sankya vyavaste

Sambhashaneyalli Eakavachana mattu Bhahuvachana- (Singular and Plural nouns)  
Viruddha padagalU /Virodharthaka padagalU (Antonyms) Asamanjasa Uchcharane  
(Inappropriate Pronunciation)

Sankhya Vyavasthe(Numbers system) -Samaya /Kalakke Sambhandhisida padhagalU  
(Words Relating to time) – Dikkugalige sambhadhisida padhagalU (Words Relating to  
Directions)

Aaharakke sambandisida padagaLu(Names connected with food)  
Manavana shareerada bhagagalu / angagalu (Parts of the Human body) Manava Sambhandhada da padhagalu (Terms Relating to Human Relationship)  
Manavana Bhavanegalige sambandisida Padagalu (Words Relating to Human's feelings and Emotions)  
Vaasada staLakke sambhandisidanthaha padhagalu (Words Relating to place of leaving)

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations

## Unit V

### **Kannada Bhasheyalli Sambhashanegalu- Conversations in Kannada**

Samanya Sambhashaneyalli Kannadada Padagalu mattu Vaakyagalu.  
(Kannada Words and Sentences in General Conversation with activities)  
(Conversation in Shop, Hostel, Market, Bus and Train)  
Shabdakosha: Vocabulary – chaTuvaTike: Exercises  
Vicharaneya / Bedikeya vakyagalu(Enquiry /Request sentences in Conversation)  
Shabdakosha – Vocabulary - Exercises to test their knowledge of understanding the Language.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations

### **Text Book:**

1. Dr.L.Thimmesh., Prof. Keshava muurthy, 'BaLake kannada' prasarangaa, VTU,2020

### **Reference Books:**

1. **Smt. KanyaKumari.S** –'Kannada Kali ' Kinnari publications' First edition, Bengaluru,2022
2. **Lingadevaru Halemane** – 'Kannada Kali', Prasaranga kannada University Hampi, 6<sup>th</sup> Edition. 2019

### **Course Outcomes (COs):**

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

1. Develop vocabulary (PO-10)
2. Identify the basic Kannada language skill(PO-10)
3. Develop listing & speaking skill in Kannada language. (PO-6, PO-12)
4. Enrich language skill. (PO-12)
5. Apply Kannada language skill for various purpose(PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

## ಕನ್ನಡ ಮನಸು

Course Code: HSCP16/26M

Credits: 1:0:0

Pre-requisites: -

Contact Hours: 14L

Course Coordinator: Mrs. Kanya Kumari S

### ಘಟಕ 1 (Unit I)

#### ಲೇಖನಗಳು (Articles) – ಕಾವ್ಯಭಾಗ (poetry)

ಕನ್ನಡ ಭಾಷೆ ನಾಡು - ನುಡಿ

ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ

ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ

ವಚನಗಳು-ಅಕ್ಕಮಹಾದೇವಿ-ಬಸವಣ್ಣ-ಅಲ್ಲಮಪ್ರಭು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 2 (Unit II)

#### ಕೀರ್ತನೆ ಮತ್ತು ತತ್ವ ಪದಗಳು

ಪುರಂದರ ದಾಸರು

ಶಿಶುನಾಳ ಶರೀಫರು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 3 (Unit III)

#### ಆಧುನಿಕ ಕಾವ್ಯಗಳು

ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ

ಕುರುಡು ಕಾಂಚಾಣ

ಚೋಮನ ಮಕ್ಕಳ ಹಾಡು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 4 (Unit IV)

#### ತಾಂತ್ರಿಕ ಧುರೀಣರು( ವ್ಯಕ್ತಿ ಪರಿಚಯ) ಕಥೆ-ಪ್ರವಾಸ ಕಥನ

ಡಾ.ಸರ್.ಎಂ.ವಿಶ್ವೇಶ್ವರಯ - ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ.ಎನ್.ಮೂರ್ತಿರಾಯರು

ಯುಗಾದಿ - ವಸುಧೇಂದ್ರ

ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ - ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

### ಘಟಕ 5 (Unit V)

ಕರಕುಶಲ ಕಲೆಗಳು ತಾಂತ್ರಿಕ ವಿಜ್ಞಾನ (technical science )

ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆ ವಿಜ್ಞಾನ- ಕರಿಗೌಡ ಬೇಟನ ಹಳ್ಳಿ

ಕಂಪ್ಯೂಟರ್ ಹಾಗೂ ಮಾಹಿತಿ ತಂತ್ರಜ್ಞಾನ-

ಕ ಮತ್ತು ಬ ಬರಹ ತಂತ್ರಾಂಶಗಳು ಮತ್ತು ಕಂಪ್ಯೂಟರ್ ಮುಖಾಂತರ ಕನ್ನಡ ಟೈಪಿಂಗ್ ತಾಂತ್ರಿಕ ಪದಕೋಶ ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation

## ಪಠ್ಯ ಪುಸ್ತಕ (Text book):

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ'

ಸಂಪಾದಕರು:

ಡಾ.ಹಿ.ಜಿ, ಬೋರಲಿಂಗಯ್ಯ -ವಿಶ್ರಾಂತ ಕುಲಪತಿಗಳು, ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ ,ಹಂಪಿ,ಪ್ರಸಾರಂಗ

ವಿಶ್ವೇಶ್ವರಯ್ಯತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ,ಬೆಳಗಾವಿ,ಪ್ರಥಮ ಮುದ್ರಣ-2020

ಪೂರಕ ಪಠ್ಯ (reference book) ಕನ್ನಡ ಮನಸು, ಪ್ರಸಾರಂಗ - ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ-ಹಂಪಿ, ಆರನೇಮುದ್ರಣ 2016

## ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

- ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡದ ಜೊತೆಗೆ ಕ್ರಿಯಾತ್ಮಕ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಡು-ನುಡಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು (PO-6)
- ಕನ್ನಡ ಭಾಷೆಯ ವ್ಯಾಕರಣ, ಭಾಷಾರಚನೆ ಯ ನಿಯಮಗಳನ್ನು ಪರಿಚಯಿಸುವುದು (PO-10)
- ಕನ್ನಡ ಭಾಷಾಬರಹದಲ್ಲಿ ಕಂಡು ಬರುವ ದೋಷಗಳು ಮತ್ತು ಅವುಗಳ ನಿವಾರಣೆ (PO-10)
- ಸಾಮಾನ್ಯ ಅರ್ಜಿಗಳು , ಸರ್ಕಾರಿ ಹಾಗೂ ಸರ್ಕಾರಿ ಪತ್ರವ್ಯವಹಾರದ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು (PO-12)
- ಭಾಷಾಂತರ ಮತ್ತು ಪ್ರಬಂಧ ರಚನೆ ಬಗ್ಗೆ ಅರಿವು ಮೂಡಿಸುವುದು ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ, ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. (PO-12)

## Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment tool	Marks	Course outcomes attained
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO4, CO5
Average of the two internal test shall be taken for 30 marks		
Other components		
Assignment	10	CO1, CO2
Quiz	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	50 marks	CO1, CO2, CO3, CO4, CO5

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## A SCIENTIFIC APPROACH TO HEALTH

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Course Code: AECPI7/27

Credits: 1:0:0

Pre-requisites: Nil

Contact Hours: 14L

Course Coordinator: Dr. Anita Kanavalli

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### Course Content

#### Unit I

##### **Good Health and its balance for positive mindset (2 lecture hours)**

Health- its importance, factors, beliefs and behaviour, Good health benefits, Health and Society, Health and family, Health and Personality, Health and behaviour, Disparities of health in different vulnerable groups. Health and psychology, Methods to improve good psychological health. Psychological disorders (Stress and Health – Stress management), Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for YouTube videos/ Animation videos: [https://www.youtube.com/watch?v=71\\_NkXgAK1g](https://www.youtube.com/watch?v=71_NkXgAK1g)  
<https://www.youtube.com/watch?v=mwuahwbIBnE>

#### Unit II

##### **Building of healthy lifestyles for better future (3 lecture hours)**

Role of diet for good health, Food and health, Nutritional guidelines for good health and wellbeingness, Obesity and overweight disorders and its management, Eating disorders-proper exercises for its maintenance (Physical activities or health),Fitness components for health, Wellness and physical function.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos: <https://www.youtube.com/watch?v=c06dTj0v0sM>  
<https://www.youtube.com/watch?v=Y8HIFRPU6pM>

#### Unit III

##### **Creation of Healthy and caring relationships (3 lecture hours)**

Building communication skills (Listening and speaking),Friends and friendship -education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology),Changing health behaviours through social engineering.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos: <https://www.youtube.com/watch?v=IwZIFG-3Y4o>  
<https://www.youtube.com/watch?v=rzEI6ZVMGW8>



## Unit IV

### Avoiding risks and harmful habits (3 lecture hours)

Characteristics of health compromising behaviors, addictions -recognizing and avoiding, addictive behaviors, Types of addictions, influencing factors for addictions, Differences between addictive people and non addictive people and their behavior with society, Effects and health hazards from addictions.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos: [https://www.youtube.com/watch?v=S-12Zj\\_JIRQ](https://www.youtube.com/watch?v=S-12Zj_JIRQ)
- <https://www.youtube.com/watch?v=OnFVffAImEg>

## Unit V

### Preventing and fighting against diseases for good health (3 lecture hours)

Occurrence of infections and reasons, protection from different types of transmitted infections, Current trends of socioeconomic impact, Reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life, Health and Wellness of youth, Measuring of health and wealth status.

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for YouTube videos/ Animation videos: <https://www.youtube.com/watch?v=X0OxrsgAP2w>  
<https://www.youtube.com/watch?v=Ap1FXfy91d4>

### Text Books:

1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor –Published by Routledge 71 Third Avenue, New York, NY 10017.
2. Health Psychology A Textbook, (Fourth Edition) by Jane Ogden McGraw-Hill Education (India) Private Limited- Open University Press

### Reference Books:

1. Health Psychology (Ninth Edition) by SHELLEYE. TAYLOR-University of California, Los Angeles, McGraw-Hill Education (India) Private Limited- Open University Press
2. Scientific Foundations of Health (Health & Wellness)- General Books published for university and colleges references by popular authors and published by the reputed publisher.

### Video Lectures:

1. SWAYAM/NPTL/MOOCs/Weblinks/Internetsources/YouTubevideosandothermaterials/notes.

## Course Outcomes (COs):

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

1. Demonstrate the skills to live a healthy life and be a part of a healthy community (PO-6, PO-7)
2. Learn how to use their stream of study towards sustainable living. (PO-7, PO-8)
3. Demonstrate the knowledge as a gateway for exchange of innovative thinking contributing to healthy individual and community. (PO-8, PO-9)
4. Learn to cultivate psycho-social behavioral quality. (PO-9, PO-10)
5. Understand the importance of science and scientific applications to enhance health. (PO-10, PO-12)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4
Average of the two internal test shall be taken for 30 marks		
<b>Other components</b>		
MCQ /Casestudy/group activity with report writing	20	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
90 minutes (02 Hours duration).	50	CO1, CO2, CO3, CO4, CO5

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# ELEMENTS OF MECHANICAL ENGINEERING

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Course Code: MEM28

Credits: 2:0:0

Pre-requisites: -

Contact Hours: 28L

Course Coordinator: Dr. Anilkumar T

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## Course Content

### Unit I

#### Engineering Materials and Metal Joining Processes (5 hours)

Engineering Materials: Mechanical Properties of Engineering materials, classification, examples and broad applications.

Metal Joining Processes: Welding, Classification of welding, Oxyacetylene welding, Arc welding, Electrodes, Soldering and Brazing, Resistance Welding-Spot, Seam, Projection, Flash welding, percussion welding, Resistance Butt welding, Electron Beam Welding

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: Arc Welding and soldering
- Links: Mechanical Properties of Engineering materials: <https://www.youtube.com/watch?v=WSRqJdT2COE&t=83s>  
Oxyacetylene welding: <https://www.youtube.com/watch?v=-SA4D098u-Q>

### Unit II

#### Internal Combustion Engines and Electric Vehicles Basics (6 hours)

Internal combustion Engines: Classification, Parts of an I C engine, 2 stroke, 4 stroke, petrol and diesel engines, Simple numerical problems on indicated power, Indicated thermal efficiency, Brake power, Brake thermal efficiency, Mechanical efficiency, Specific fuel consumption, Demonstration of I.C. engine

Electric Vehicles Basics: Types of batteries, Regenerative braking systems

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos, Demonstration using IC engine models
- Lab component/Practical topics: Internal Combustion Engine (Demonstration)
- Links: Internal Combustion Engine: <https://www.youtube.com/watch?v=mRcFO7X8yP4>  
Links: Electric Vehicle: <https://www.youtube.com/watch?v=xE0d0JtXVLw>

### Unit III

#### Refrigeration and Air Conditioning and Non-Conventional Machining Methods (5 hours)

Refrigeration and Air Conditioning: Classification of Refrigeration, Working Principles of Vapor Compression, Properties of Refrigerant, Working principle of Window Air Conditioner. Heating and Ventilation.

Non-Conventional Machining Methods - Abrasive Jet Machining, Water Jet Machining, Ultrasonic Machining, Electron Beam Machining

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos, Demonstration using IC engine models
- Lab component/Practical topics: Vapour Compression Refrigeration (Demonstration)
- Links: Refrigeration: <https://youtu.be/PjcdqAkP0UA>  
Electron Beam machining: <https://youtu.be/dP2m7-WAdos>

## **Unit IV**

### **Power Transmission (6 hours)**

Belt drives; Types, Velocity ratio, Slip, Length of belts for Open belt and Cross belt drive, Angle of lap, ratio of belt tensions, Power transmitted, Creep in belt drive, Pulleys; Stepped, Tight and loose, Idler, V-belt drive (Excluding Derivation and Numericals on V-Belt drive). Simple numerical problems;

Gear Drives: Classification of gears, Spur gear nomenclature, Velocity ratio, Rack and Pinion, Helical gears, Bevel gears and Worm gears;

Gear Trains: Train values, Classification of gear trains and their uses, Simple numerical problems on simple, Compound and Reverted gear trains.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: Gear trains in lathe machine
- Links: Belt drives: [https://www.youtube.com/watch?v=0mb\\_XMGja\\_c](https://www.youtube.com/watch?v=0mb_XMGja_c)  
Gear trains: <https://www.youtube.com/watch?v=tjNsUzxRjfw>

## **Unit V**

### **Robot Technology, Computer Numerical Control Machines and Additive Manufacturing (6 hours)**

Robotics: Introduction to Robots, History, Criteria for defining a robot, work volume, robot anatomy, joint configuration, sensors, industrial and collaborative robots

Computer Numerical Control Machines: Numerical control, Computer numerical control and Direct numerical control

Additive Manufacturing: Basic Definition and Applications; Direct and Indirect Application levels, Nomenclature of Additive manufacturing machines, Types of Additive manufacturing process, SLA Process, SLS process, FDM process, Applications of Additive manufacturing

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: Robot technology
- Links: Direct NC Machines: <https://youtu.be/8wNtQ29rodI>  
SLS Process: [https://www.youtube.com/watch?v=9E5MfBAV\\_tA](https://www.youtube.com/watch?v=9E5MfBAV_tA)

### **Text Books:**

1. K. R. Gopalakrishna, Sudhir Gopalakrishna, S.C.Sharma –'Elements of Mechanical Engineering', Sudha Publications, Jan 2016.
2. Basic Mechanical Engineering-Pravin kumar, Dorling Kindersley (India) Pvt Ltd, 2013
3. Ali Emadi- Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, CRC Press, 2nd edition
4. Mikell P Groover, Mitchell Weiss, Roger N.Nagel, Nicholas G Odrey-Industrial Robotics Technology, Programming and Applications, McGraw-Hill International Edition 1986
5. Andreas Gebhardt-Understanding Additive Manufacturing-Hanser Publications, Cincinnati

### **Reference Books:**

1. K. P. Roy, S. K. Hajra Choudhury, A. K. Hajra Chaudhury & Nirjhar Roy-Elements of Mechanical Engineering –, Media Promoters & Publishers Pvt Ltd, Seventh edition, 2012.
2. John Lowry-Electrical Vehicle Technology Explained –, John Wiley & Sons Ltd, Second Edition, 2012.
3. P. M. Agrawal and Dr. V. J. Patel - CNC Fundamentals and Programming, Charotar Publishing House Pvt. Ltd., 3rd edition, 2022
4. Appu Kuttan K. K, Robotics I K International Publishing House, Pvt Ltd, 2013
5. Manu Srivastava, Sandeep Rathee, Sachin Maheshwari, T K Kundra-Additive Manufacturing Fundamentals and Advancements CRC Press, 2019.

### **Web links and video lectures (e-Resources)**

1. <https://nptel.ac.in/courses/112/103/112103263/>
2. <https://nptel.ac.in/courses/108/106/108106170/>
3. <https://archive.nptel.ac.in/courses/112/107/112107208/>
4. <https://youtu.be/c2b160dGpXs?list=PLWM0wjHbgpgVJhZiQTdBOWjy-sOFDsnz-9>
5. [archive.nptel.ac.in/courses/112/105/112105211/](https://archive.nptel.ac.in/courses/112/105/112105211/)

### **Course Outcomes (COs):**

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

1. Memorize the list of materials used in aerospace, human implants, defense, jet engines, automobiles, etc and on basics of metal joining processes
2. Record the basics of IC Engines and the fundamentals of Electric Vehicle Technology
3. Recognize broadly and understand the basics of Conventional Machining methods as well learn basics of Refrigeration and Air-Conditioning
4. Understand the fundamental power transmission systems that are used in the industrial world
5. Explain the importance of 3D manufacturing techniques and also fundamentals of Robotics

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## ELEMENTS OF MECHANICAL ENGINEERING LAB/ WORKSHOP

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**Course Code:** MELM29

**Credits:** 0:0:1

**Pre-requisites:** Nil

**Contact Hours:** 14P

**Course Coordinator:** Dr. Aruna kumara P C

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### Course Content

1. Fitting Shop: Fitting of any *two* common joints.
2. Welding Shop: Welding of any *two* common joints.
3. Sheet Metal Work Sheet-metal models – Rectangular Prism closed at one end, Rectangular 90° tray & Funnel.
4. Machine Shop: *Two* lathe models involving step turning, taper turning and knurling operations.
5. Demonstration of Radial drilling machine operations and typical milling operations.
6. Practice of drilling using lathe and drilling machine.
7. Practice of use of Power Tools for common machining operations.
8. Demonstration on 3-D printing

### Text Book:

1. Work shop manual-Department of Mechanical Engineering. MSRIT, Bangalore, 9th edition 2021.

### Reference Books:

1. S.K.H. Choudhury- A.K.H. Choudhury, Nirjhar Roy- The Elements of Workshop Technology, Volume I & II, Media promoters and publishers, Mumbai, 11th edition, 2001.
  2. James Anderson, Earle E Jatro- Shop Theory, Tata McGraw hill publications, 2nd edition, 2005.
  3. Chee Kai Chua and Kah Fai Leong -3D Printing and Additive Manufacturing, The 5th edition of Rapid Prototyping, January 2007.
- Pedagogy/Course delivery tools: Chalk and talk, power point presentation (PPT) and Videos.
  - Video Links for fitting model: [https://www.youtube.com/watch?v=9\\_UPVCITv4w](https://www.youtube.com/watch?v=9_UPVCITv4w)
  - Video Link for sheet metal model(Funnel): <https://www.youtube.com/watch?v=owEdINlhSIU>
  - Video Link for Arc Welding: <https://www.youtube.com/watch?v=CoHVA7nr82A>
  - Video Link for Lathe model: <https://www.youtube.com/watch?v=hheFVuUBpxo>
  - Video Link 1 for 3d printed model: [https://www.youtube.com/watch?v=Q-chiA\\_Q-1kY](https://www.youtube.com/watch?v=Q-chiA_Q-1kY)
  - Video Link 2 for 3d printed model: <https://www.youtube.com/watch?v=JzNdv-ZLoKAI>

## Course Outcomes (COs):

At the end of the course, the students will be able to

1. Remember the role of basic workshop practices in the functioning of various daily life appliances. (PO-1, PO-2, PO-3, PO-5, PO-12)
2. Understand the significant details of workshop tools, machines and simple fabrication processes. (PO-1, PO-2, PO-3, PO-12)
3. Apply the knowledge of workshop practice methods to demonstrate utilitarian skills. (PO-1, PO-3, PO-5, PO-12).

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Preparation of models and record submission	30	CO1, CO2, CO3
Laboratory Test	15	CO1, CO2, CO3
Viva-Voce	05	CO1, CO2, CO3
<b>Semester End Examination (SEE)</b>	50	

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## ENGINEERING PHYSICS LABORATORY

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**Course Code: PYLM29**

**Credits: 0:0:1**

**Pre-requisites: Nil**

**Contact Hours: 14P**

**Course Coordinator: Dr. B Siddlingeshwar**

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### Course Content

1. General Instructions and Introduction to Error Analysis.
2. Plotting of forward and reverse bias characteristics of a Zener Diode and determination of breakdown voltage.
3. Determination of numerical aperture, Acceptance angle and bending loss in Optical Fibre Cable.
4. Measurement of capacitance and dielectric constant of a capacitor by charging and discharging it through a resistor.
5. Calculation of Planck's constant using LEDs.
6. Verification of Stefan's law
7. Identification of different components (L,C or R) of a Black Box and calculation of their values through frequency response curves.
8. Determination of Moment of inertia of an irregular body and rigidity modulus of the material of the suspension wire using torsional oscillations.
9. Determination of Young's Modulus of the material of the single cantilever beam.
10. Determination of Energy gap of semiconductor.
11. Determination of Fermi energy of a metal.
12. Measurement of operating wavelength of semiconductor laser using Laser diffraction.
13. Calculation of thickness of given paper strip by the method of interference fringes (Air wedge).
14. Frequency response of series and parallel LCR circuits and calculation of Q-factor and band width.
15. Determination of Hall coefficient and concentration of charge carriers of the semiconductor.
16. Simulation of electrical experiments using Pspice

Students are required to perform 12 prescribed experiments (from 2 to 16) in the above list. Cyclic order will be followed.

### Reference Books:

1. Laboratory manual prepared by the Physics department, RIT, Bangalore



## Suggested Learning e-Resources (Web links and Video Lectures)

1. <https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1>
2. <https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html>
3. [https://virtuallabs.merlot.org/vl\\_physics.html](https://virtuallabs.merlot.org/vl_physics.html)
4. <https://phet.colorado.edu>
5. <https://www.myphysicslab.com>

## Course Outcomes (COs):

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

1. Determine elastic constants of material using torsion pendulum and cantilever. (PO-1, PO-4)
2. Apply the concepts of interference and diffraction of light to determine thickness of thin films and wavelength of light. (PO-1, PO-4)
3. Construct and analyze simple AC and DC circuits to determine electrical parameters, familiarity with the concepts of modern Physics. (PO-1, PO-4, PO-5)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Weekly evaluation of laboratory journals/ reports after the conduction of every experiment.	30	CO1, CO2, CO3
Practical test	20	CO1, CO2, CO3
<b>Semester end Examination (SEE)</b>	50	CO1, CO2, CO3

# **ENGINEERING SCIENCE COURSES (ESC)**

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# INTRODUCTION TO CIVIL ENGINEERING

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Course Code: ESC131/231

Credits: 3:0:0

Pre-requisites: Nil

Contact Hours: 42L

Course Coordinator: Dr. B Suguna Rao

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## Course Content

### Unit I

#### Civil Engineering Disciplines and Building Science

**Introduction to Civil Engineering:** Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management.

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

**Structural elements of a building:** foundation, plinth, Masonry wall, column, beam, slab, and staircase.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations, Videos
- Links: Introduction: <https://a.impartus.com/ilc/#/video/id/534326>
- Scopes of Various fields: <https://a.impartus.com/ilc/#/video/id/536441>

**Self Study:** Building components such as Lintel and Chejja

### Unit II

#### Societal and Global Impact of Infrastructure

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

**Environment:** Water Supply and Sanitary systems, urban air pollution management, Solid waste management, urban flood control

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

- Pedagogy/ Course delivery tools: Chalk and Talk, Power point presentations, Videos
- Links: Infrastructure Habitats: <https://www.youtube.com/watch?v=wpvbVyUCi78>  
<https://www.youtube.com/watch?v=Irq4BigInDU>

**Self Study:** Clean city concept, identification of Landfill sites.

### Unit III

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

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations, Videos
- Links: Introduction to:  
Engg. Mechanics - <https://a.impartus.com/ilc/#/video/id/532408>  
Resultants - <https://a.impartus.com/ilc/#/video/id/537603>  
Equilibrium Concepts: <https://a.impartus.com/ilc/#/video/id/550330>

**Self Study:** Law of Parallelogram of forces, Numerical on Couple, and moment.

## Unit IV

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

**Friction:** Definition of friction and its application, angle of friction, angle of repose, coefficient of friction, Types of friction, laws of static friction, Description, and application of friction on blocks on horizontal and inclined planes.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations, Videos
- Links: [https://www.youtube.com/watch?v=QK\\_TuE2lfSc](https://www.youtube.com/watch?v=QK_TuE2lfSc)
- Friction concepts: <https://www.youtube.com/watch?v=AlenFWwK3Ek>

**Self Study:** Derivation of Centroid of semicircle and quarter circle.

## Unit V

**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.

- Pedagogy/Course delivery tools: Chalk and Talk, Power point presentations
- Links: Moment of Inertia: <https://www.youtube.com/watch?v=Bl5KnQOWkY>

**Self Study:** Derivation of moment of inertia of semicircle and quarter circle.

### Text Books:

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

### Reference Books:

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

5. Bhavikatti S S, Engineering Mechanics, 2019, New Age International
6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

### Web links and video Lectures (e- Resources):

1. <https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT>
2. <https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=2>
3. <https://www.youtube.com/watch?v=3YBXteL-qY4>
4. <https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10>
5. <https://www.youtube.com/watch?v=lheoBL2QaQU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7>
6. [https://www.youtube.com/watch?v=atoP5\\_DeTPE](https://www.youtube.com/watch?v=atoP5_DeTPE)
7. <https://www.youtube.com/watch?v=ksmsp9OzAsI>
8. <https://www.youtube.com/watch?v=x1ef048b3CE>

### Course Outcomes (COs):

On successful completion of the course students will be able to

1. Understand the vast interface of civil engineering fields towards the society at large.
2. Recognize the societal and global impact towards employment creation and its contribution to the GDP.
3. Analyze and evaluate the coplanar concurrent and non concurrent force system.
4. Locate the centroid of bodies and frictional force developed between the bodies.
5. Compute the moment of inertia of plane areas about a given axis.

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Assessment-I	30	CO1, CO2, CO3
Internal Assessment-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Assignment	10	CO1, CO2
Assignment	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer one question from each unit –internal choice)	100	CO1, CO2, CO3, CO4, CO5

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# INTRODUCTION TO ELECTRICAL ENGINEERING

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Course Code: ESC132/232

Credits: 2:1:0

Pre-requisites: Nil

Contact Hours: 28L+14T

Course Coordinators: Sri. Vinayaka V Rao and Dr Nagaraj C

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## Course Content

### Unit I

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

**Power Generation:** Hydel, Nuclear, Solar & wind power generation (Block Diagram approach). Grid and its types. Types of loads.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for power generation, transmission distribution and Tariff: <http://www.nptelvideos.in/2012/11/power-sys-generation-transmission.html>

### Unit II

**DC Circuits:** Ohm's Law and its limitations. KCL, KVL, Thevenin, Maximum power transform and Superposition theorems. Series, parallel, series-parallel circuits. (Only for resistive networks) Simple Numerical

- Pedagogy / Course delivery tools: Chalk and Talk
- Link for Introduction to KCL, KVL and Power Balance: <https://nptel.ac.in/courses/108105159>

### Unit III

**A.C. Fundamentals:** Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (Only definitions)

Analysis of R, L, C, R-L, R-C and R-L-C Series circuits. Concept of power and power factor. (Simple Numerical).

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for AC and DC waveform: <https://www.youtube.com/watch?v=vN9aR2wKv0U>
- Link for Generation of sine wave: <https://www.youtube.com/watch?v=gQyamjPrw-U>

### Unit IV

**Introduction to Electrical Machines:** Transformers: Necessity of transformer, principle of operation, Types and construction of single- phase transformers, EMF equation, losses, Efficiency. Simple numerical.

**Introduction to Three-Phase systems.**

**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.

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for Transformer: [https://www.youtube.com/watch?v=vh\\_aCAHThTQ](https://www.youtube.com/watch?v=vh_aCAHThTQ)
- Link for 3-Phase Induction Motor:  
[https://www.youtube.com/watch?v=AQqyGNOP\\_3o](https://www.youtube.com/watch?v=AQqyGNOP_3o)  
<https://www.youtube.com/watch?v=Mle-ZvYi8HA>

## Unit V

**Domestic Wiring:** Requirements, Types of wiring: Two way and three-way control of load.

**Electricity Bill:** Power rating of household appliances, two-part electricity tariff, calculation of electricity bill for domestic consumers.

**Equipment Safety measures:** Fuse and Fuse gauge. Miniature circuit breaker (MCB), merits and demerits.

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

- Pedagogy / Course delivery tools: Chalk and Talk, Power Point Presentation
- Link for MCB: <https://www.youtube.com/watch?v=9Xgn40eGcqY>
- Link for Electrical safety animation: <https://www.youtube.com/watch?v=yAz9Ungv2Xc>

### Text Books:

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

### Reference Books:

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

### Web links and video Lectures (e- Resources):

1. <https://nptel.ac.in/courses/108/108/108108076/>
2. <https://a.impartus.com/ilc/#!/course/59745/295>

### Course Outcomes (COs):

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

1. Interpret the concepts of Electrical Power (PO-1)
2. Solve problems in DC and AC circuits (PO-1)
3. Exemplify the concepts of Electrical Machines (PO-1)
4. Explain the types of wiring and lighting systems (PO-1)
5. Identify types of protective systems and safety precautions (PO-1, PO-6)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Assignment	10	CO4, CO5
Quiz	10	CO2, CO3
<b>Semester End Examination (SEE)</b>		
Course end examination (Answer one question from each unit- internal choice)	100	CO1,CO2,CO3,CO4, CO5



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# INTRODUCTION TO ELECTRONICS ENGINEERING

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Course Code: ESC133/233

Credits: 3:0:0

Pre-requisites: Physics of Semiconductors

Contact Hours: 42L

Course Coordinator: Mr. Manjunath C Lakkannavar

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## Course Content

### Unit I

**Semiconductor Devices:** Introduction, Semiconductor diodes: PN junction diode and its characteristics, Diode types, Zener diodes, Light emitting diodes, Bipolar junction transistors: BJT operation, Characteristics, Current gain.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/117103063>
- Links: <https://a.impartus.com/ilc/#/course/80947/295>

### Unit II

**Power Supplies:** Block diagram, Half-wave rectifier, Full-wave rectifiers (Center Tapped/Bi-phase and Bridge) and Capacitor filter circuit, Zener diode voltage regulators, Output resistance and voltage regulation, Voltage multipliers

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/117103063>
- Links: <https://a.impartus.com/ilc/#/course/80947/295>

### Unit III

**Amplifiers:** Types of amplifier, Gain, Common-emitter configuration as an Amplifier, Common-emitter configuration as Switch: Cut-off and saturation modes.

**Oscillators:** Positive feedback, Conditions for oscillation, BJT as an Oscillator ( LC).

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/117103063>
- Links: <https://a.impartus.com/ilc/#/course/80947/295>

### Unit IV

**Logic Circuits:** Logic functions, Logic gates: NOT, AND, OR, NAND, NOR, X-OR, X-NOR, Combinational Logic: Introduction, Adders: Half adder, Full adder, Sequential Logic: Introduction to Flip Flops, JK flip flop and its applications.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/117103063>
- Links: <https://a.impartus.com/ilc/#/course/80947/295>

### Unit V

**Microprocessor:** Introduction, Block diagram of a microprocessor system, Internal architecture of 8-bit microprocessor CPU, Microprocessor operation

**Microcontroller:** Introduction, Block diagram of a microcontroller system.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/117103063>
- Links: <https://a.impartus.com/ilc/#/course/80947/295>

### Text Books:

1. Mike Tooley, 'Electronic Circuits: Fundamentals & Applications', 4th Edition, Elsevier, 2015. DOI <https://doi.org/10.4324/9781315737980eBook>, ISBN: 9781315737980

### Reference Books:

1. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203- 0417-84
2. D P Kothari, I J Nagrath, 'Basic Electronics', 2nd edition, McGraw Hill Education (India),Private Limited, 2018.

### Course Outcomes (COs):

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

1. Describe semiconductor devices. (PO-1, PO-2, PO-8)
2. Understand semiconductor applications. (PO-1, PO-2, PO-8)
3. Analyze the various circuits of BJT. (PO-1, PO-2, PO-8)
4. Analyze logic circuits. (PO-1, PO-2, PO-8)
5. Understand the architecture and operation of microprocessor and micro controller. (PO-1, PO-8, PO-10)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Quiz	10	CO1, CO2
Troubleshooting	10	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

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# INTRODUCTION TO MECHANICAL ENGINEERING

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Course Code: ESC134/234

Credits: 3:0:0

Pre-requisites: Nil

Contact Hours: 42L

Course Coordinator: Dr. Anil Kumar T

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## Course Content

### Unit I

#### Introduction to Mechanical Engineering (Overview only):

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

#### Steam Formation and Application:

Steam formation, Types of steam, Steam properties and applications of steam (simple numerical problems).

#### Energy Sources and Power Plants:

Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant and Wind power plant.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: Arc Welding and soldering
- Links: Mechanical Properties of Engineering materials: <https://www.youtube.com/watch?v=WSRqJdT2COE&t=83s>
- Links: Thermal power plant: <https://youtu.be/IdPTuwKEfmA>

### Unit II

#### Machine Tool Operations:

Lathe: Principle of working of a center lathe, lathe operations: Turning, facing, knurling, thread cutting, taper turning by swivelling the compound rest,

**Drilling Machine:** Working of simple drilling machine, drilling operations: drilling, boring, reaming, tapping, counter sinking, counter boring,

**Milling Machine:** Working and types of milling machine, milling operations: plane milling, end milling and slot milling.

**(No sketches of machine tools, sketches to be used only for explaining the operations).**

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

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos, Demonstration using IC engine models
- Lab component/Practical topics: Lathe operations, Demonstration of Drilling, Milling machine
- Links: 3D Printing: <https://youtu.be/nb-Bzf4nQdE>
- Links: CNC machine: [https://youtu.be/e\\_PDuQePdOE](https://youtu.be/e_PDuQePdOE)

## Unit III

**Introduction to IC Engines:** Components and working principles, 4-Stroke Petrol and Diesel engines, Application of IC Engines, performance of IC engines (Simple numerical).

**Introduction to Refrigeration and Air Conditioning:** Principle of refrigeration, Refrigerants and their desirable properties. Working principle of VCR refrigeration system, working principle of room air conditioner & Applications of air Conditioners

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos, Demonstration using IC engine models
- Lab component/Practical topics: Vapour Compression Refrigeration (Demonstration)
- Links: Refrigeration: <https://youtu.be/PjcdqAkP0UA>
- Links: Airconditioning: <https://youtu.be/gVLhrLTF878>

## Unit IV

**Mechanical Power Transmission:**

**Gear Drives: Types** - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems)

**Belt Drives:** Introduction, Types of belt drives (Flat and V-Belt Drive), length of the belt and tensions ratio (simple numerical problems)

**Joining Processes:** Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames), TIG welding, MIG welding and Fusion welding.

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: Gear trains in lathe machine
- Links: Belt drives: [https://www.youtube.com/watch?v=0mb\\_XMGja\\_c](https://www.youtube.com/watch?v=0mb_XMGja_c)
- Links: Gear trains: <https://www.youtube.com/watch?v=tjNsUzxRjfw>

## Unit V

**Insight into future mobility technology;** Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of Electric Vehicles (EVs) and Hybrid vehicles.

**Robotics:** Introduction to Robots, History, Criteria for defining a robot, work volume, robot anatomy, joint configuration, sensors, industrial and collaborative robots

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: Robot technology
- Links: <https://youtu.be/h5ysddrLXLw>
- Links: Robotics: [https://youtu.be/a6\\_fgnuuYfE](https://youtu.be/a6_fgnuuYfE)

**Text Books:**

1. **K. R. Gopalakrishna, Sudhir Gopalakrishna, S.C.Sharma** - 'Elements of Mechanical Engineering', Sudha Publications, Jan 2016.
2. **Basic Mechanical Engineering** - Pravin kumar, Dorling Kindersley (India) Pvt Ltd, 2013
3. **Ali Emadi** - Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design, CRC Press, 2nd edition

4. **Mikell P Groover, Mitchell Weiss, Roger N.Nagel, Nicholas G Odrey** -Industrial Robotics Technology, Programming and Applications, McGraw-Hill International Edition 1986
5. **Andreas Gebhardt** - Understanding Additive Manufacturing-Hanser Publications, Cincinnati

### Reference Books:

1. **K. P. Roy, S. K. Hajra Choudhury, A. K. Hajra Chaudhury & Nirjhar Roy** - Elements of Mechanical Engineering –, Media Promoters & Publishers Pvt Ltd, Seventh edition, 2012.
2. **John Lowry** - Electrical Vehicle Technology Explained –, John Wiley & Sons Ltd, Second Edition, 2012.
3. **P. M. Agrawal and Dr. V. J. Patel** - CNC Fundamentals and Programming, Charotar Publishing House Pvt. Ltd., 3rd edition, 2022
4. **Appu Kuttan K. K.**, Robotics I K International Publishing House, Pvt Ltd, 2013
5. **Manu Srivastava, Sandeep Rathee, Sachin Maheshwari, TK Kundra** - Additive Manufacturing Fundamentals and Advancements CRC Press, 2019.

### Web links and video lectures (e-Resources)

1. <https://nptel.ac.in/courses/103103206>
2. <https://youtu.be/1AwOzDv7j6o>
3. <archive.nptel.ac.in/courses/112/105/112105128>
4. <https://nptel.ac.in/courses/112/103/112103263>
5. <https://nptel.ac.in/courses/108/106/108106170>

### Course Outcomes (COs):

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

1. Outline the various sources of Energy method of Steam formation and explain the Emerging Trends and Technologies in different sectors
2. Understand the basics of Conventional Machining methods and understand the basic components of CNC the importance of 3D manufacturing techniques
3. Comprehend the basics of IC Engines and as well learn basics of Refrigeration and Air-Conditioning
4. Realize the fundamental power transmission systems and the concepts of metal joining processes
5. Illustrate the concepts of Electric/Hybrid Vehicle Technology and fundamentals of Robotics

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# INTRODUCTION TO C PROGRAMMING

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Course Code: ESC135/235

Credits: 2:0:1

Pre-requisites: Nil

Contact Hours: 28L+14P

Course Coordinator: Shruthi G

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## Course Content

### Unit I

**Introduction to C:** Introduction to computers, input and output devices, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C, Operators in C, Type conversion and typecasting.

- Pedagogy /Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem-solving methods  
<https://pythontutor.com/c.html#mode=edit> in order to visualize the operations of C Programs.

### Unit II

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

- Pedagogy /Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem-solving methods  
<https://pythontutor.com/c.html#mode=edit> in order to visualize the operations of C Programs.

### Unit III

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

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

- Pedagogy /Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem-solving methods  
<https://pythontutor.com/c.html#mode=edit> in order to visualize the operations of C Programs.

### Unit IV

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

**Applications of arrays:** Applications of arrays, case study with sorting and searching techniques. (Linear Search and Binary Search , Bubble Sort, Quick Sort,)

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

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
  - Link: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem-solving methods
- <https://pythontutor.com/c.html#mode=edit> in order to visualize the operations of C Programs.

## Unit V

**Strings:** String taxonomy, operations on strings (length of the string, concatenate two strings, comparing two strings, reversing a string, extracting a substring from the string), Miscellaneous string and character functions, arrays of strings.

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

**Structures:** Introduction to structures, array of structures.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
  - Link: <https://nptel.ac.in/courses/106/105/106105171/> MOOC courses can be adopted for more clarity in understanding the topics and verities of problem-solving methods
- <https://pythontutor.com/c.html#mode=edit> in order to visualize the operations of C Programs.

### Lab Component:

1. Write a program to calculate the salary of an employee, given his basic pay (to be entered by user), HRA = 10% of the basic pay, TA = 5% of basic pay. Define HRA and TA as symbolic constants and calculate the salary of the employee. [Salary = Basic Pay + HRA + TA]  
[Problems as per domain can be assigned]
2. Write a program to calculate the parking charges of a vehicle. Enter the type of vehicle as a character (like c for car, b for bus etc) and the number of hours. Then calculate the charges as given below.  
[ Program must be implemented using Switch and else-if]
  - Truck / Bus – Rs 20 per hour
  - Car – Rs 10 per hour
  - Scooter/ Cycle/ Motor cycle – Rs 5 per hour
3. Write a program to find the GCD and LCM for any two given numbers using 'while' loop.
4. Write a program to generate prime numbers within a given range. [using for loop]
5. Write a program to multiply two matrices [2 – Dimensional arrays].
6. Write a program to search for a given element within a list of elements using binary search [List of elements to be stored in a 1 – Dimensional array].
7. Write a program to build user defined functions, to calculate
  - a) The factorial of a given number using recursion
  - b) To find whether the given number is a palindrome or not [No arguments but with return values].
8. Write a program to read 6 subject marks from the keyboard for a student.

Generate a report that displays the marks from the highest to the lowest score attained by the student. [Read the marks into a 1-Dimensional array and sort using the Bubble Sort technique].

9. Write a program using built in string functions to
  - a. To convert “gud morning” to “GUD MORNING”.
  - b. Count the number of characters in “Gud Morning”.
  - c. To append the word “All” to the string “Good Morning”.
  - d. Reverse the string “Morning” and check if the given string is a palindrome or not.
10. Write a program using functions to swap two integer values using call by reference.
11. Define a structure containing the following details for 5 students: Name of Student, Age, Marks of 5 subjects [ Use array of Structures]. Generate a report for the following
  - a. The total average marks for each student
  - b. The class average for each subject
12. Write a program to find the sum of all elements of a 1 -dimensional array using pointers.

### **Text Books:**

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

### **Reference Books:**

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The ‘C’ Programming Language, Prentice Hall of India.

### **Course Outcomes (COs):**

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

1. Understand the basic architecture and functionalities of a computer. (PO-1)
2. Apply programming constructs of C language to solve the real world problems (PO-1, PO-2, PO-3)
3. Develop Solutions to problems using modular programming constructs using user-defined functions. (PO-1, PO-2, PO-3)
4. Use arrays and strings to implement solutions to the given problems. (PO-1, PO-2, PO-3)
5. Apply concept of structures and pointers to solve the given problems. (PO-1, PO-2, PO-3)



## Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tool	Marks	Course outcomes attained
Internal test-I	30	CO1, CO4
Internal test-II	30	CO2, CO3, CO5
Average of the two internal tests shall be taken for 30 marks.		
Other Components		
Lab Component Evaluation	20	CO1, CO2, CO3, CO4, CO5
<b>Semester-End Examination (SEE)</b>	100	CO1, CO2, CO3, CO4, CO5

## Laboratory Schedule:

Session No	Topics: Programming Assignments	No. of hours
1	<p><b>Creating and Running Simple C Programs:</b></p> <ol style="list-style-type: none"> <li>Write a program to swap two numbers without using a temporary variable.</li> <li>Write a program to convert degrees Fahrenheit into degrees Celsius.</li> <li>Write a program to calculate the area and circumference of a circle, using PI as symbolic constant.</li> <li>Write a C program to calculate the bill amount for an item given its quantity sold, value, discount (declare as constant) and tax (declare as constant).</li> <li>Write a C program to read two floating point numbers. Add these numbers and assign the result to an integer. Finally display the value of all three variables.</li> <li><b>Write a program to calculate the salary of an employee, given his basic pay (to be entered by user), HRA = 10% of the basic pay, TA = 5% of basic pay. Define HRA and TA as symbolic constants and calculate the salary of the employee. [Salary = Basic Pay + HRA + TA]</b></li> </ol>	2hr
2	<p><b>Creating and Running C Programs on Making Decisions - 1:</b></p> <ol style="list-style-type: none"> <li>Write a program to find the given year is a leap year or not.</li> <li>Write a program to determine whether the given character is a vowel or not.</li> <li>Write a program to identify whether the given character is an alphabet, digit, whitespace or punctuation using 'simple if'</li> <li>Write a C Program to find whether the given triangle is equilateral, isosceles or scalene.</li> <li>Write a program to find the greatest of two numbers using conditional operator.</li> <li>Write a program, to find the greatest of three numbers using nested -if.</li> </ol>	2hr

3	<p><b>Creating and Running C Programs on Making Decision - 2:</b></p> <ol style="list-style-type: none"> <li>1. Find the roots of a quadratic equation using Switch statement. (<math>D=0, D&gt;0, D&lt;0</math>)</li> <li>2. Write a program that accepts a number from 1 to 10. Print whether the number is even or odd using switch case construct.</li> <li>3. Write a C program to enter the marks of a student in four subjects. Then calculate the total, aggregate and display the grades obtained by the student (Using SWITCH).</li> <li>4. <b>Write a program to calculate the parking charges of a vehicle. Enter the type of vehicle as a character (like c for car, b for bus etc) and the number of hours. Then calculate the charges as given below. [Program must be implemented using Switch and else-if]</b> <ul style="list-style-type: none"> <li>• Truck / Bus – Rs 20 per hour</li> <li>• Car – Rs 10 per hour</li> <li>• Scooter/ Cycle/ Motor cycle – Rs 5 per hour</li> </ul> </li> </ol>	2hr
4	<p><b>Creating and Running C Programs on Repetition or Loops:</b></p> <ol style="list-style-type: none"> <li>1. Write a program to calculate the sum of numbers from m to n using FOR loop.</li> <li>2. Write a program to generate the Fibonacci series up to 'nth' given number using WHILE loop.</li> <li>3. Write a program to generate prime numbers within a given range. [using for loop]</li> <li>4. Write a program to check whether the given number is a palindrome or not using DO - WHILE loop.</li> </ol>	2hr
5	<p><b>Creating and Running C Programs on One Dimensional Arrays:</b></p> <ol style="list-style-type: none"> <li>1. Write a C program to find the average of all elements of a 1D array.</li> <li>2. Write a C program to search for an element using Linear Search.</li> <li>3. The books are placed in a random order in a library. Write a C program to sort the books based on ISBN (Bubble Sort).</li> <li>4. Write a C program to search for a book based on the ISBN whether the book is present or not (Binary Search).</li> </ol>	2hr
6	<p><b>Creating and Running C Programs on Two Dimensional Arrays:</b></p> <ol style="list-style-type: none"> <li>1. Write a C program to find the sum of two matrices using functions.</li> <li>2. <b>Write a C program to find the product of two matrices.</b></li> <li>3. Write a C program to find the transpose of a given matrix.</li> </ol>	2hr
7	<p><b>Creating and Running C Programs on User Defined Functions:</b></p> <ol style="list-style-type: none"> <li>1. C-program to read a number, find its factorial using recursive function</li> <li>2. <b>C-Program to read a number, find whether it is prime number using functions (all categories).</b></li> <li>3. Write a C program to find the smallest and largest element of an array using functions.</li> <li>4. Write a program using functions to swap two integer values using call by reference.</li> </ol>	2hr
8	<p><b>Creating and Running C Programs on Strings:</b></p> <ol style="list-style-type: none"> <li>1. C-program read two strings, compare them without using string built-in functions.</li> <li>2. C-program read two strings, concatenate them without using string built-in functions.</li> <li>3. <b>Write a program using built in string functions to</b> <ol style="list-style-type: none"> <li>a) <b>To convert “gud morning” to “GUD MORNING”.</b></li> <li>b) <b>Count the number of characters in “Gud Morning”.</b></li> <li>c) <b>To append the word “All” to the string “Good Morning”.</b></li> <li>d) <b>Reverse the string “Morning” and check if the given string is a palindrome or not.</b></li> </ol> </li> </ol>	2hr

9	<b>Creating and Running C Programs on Storage Classes and Pointers:</b> 1. C-program to show the use of auto and static variable. 2. <b>C-program to add elements of an array using pointers.</b> 3. C-program to swap two numbers using pointers.	2hr
10	<b>Creating and Running C Programs on Structures</b> 1. Write a C program using structures to read and display the information about an employee. 2. <b>Define a structure containing the following details for 5 students: Name of Student, Age, Marks of 5 subjects [ Use array of Structures]. Generate a report for the following</b> a. <b>The total average marks for each student</b> b. <b>The class average for each subject</b>	2hr

# **PROGRAMMING LANGUAGE COURSES (PLC)**

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# INTRODUCTION TO WEB PROGRAMMING

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Course Code: PLC141/241

Credits: 2:0:1

Pre-requisites: Nil

Contact Hours: 28L+14P

Course Coordinator: Ashwitha A

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## Course Content

### Unit I

**Introduction to Web Programming:** Structural Elements, Title Element, meta Element, HTML Attributes, Body Element, Differences between Old HTML and HTML5, HTML Coding Conventions. Comments, Block Elements, block quote Element, Whitespace Collapsing, pre Element, Phrasing Elements, Editing Elements, q and cite Elements, dfn, abbr, and time Elements br and wbr Element, sub, sup, s, mark, and small Elements, strong, em, b, u, and i Elements, Span Element.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Demonstration of code
- Links: [https://www.w3schools.com/html/html\\_attributes.asp](https://www.w3schools.com/html/html_attributes.asp)

### Unit II

**HTML5:** Hello HTML5, Loose Syntax Returns, XHTML5, HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics: Marking Text, Indicating Dates and Time, Inserting Figures, HTML5's Open Media Effort: Audio, Video, Client-Side Graphics with: Drawing and styling lines and shapes.

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Demonstration of code
- Links: <https://www.w3schools.com/charsets/tryit.asp?deci=193&ent=Aacute>

### Unit III

**Introduction to CSS:** CSS Overview, CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color, Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Demonstration of code
- Links: [https://www.w3schools.com/css/css\\_syntax.asp](https://www.w3schools.com/css/css_syntax.asp)

### Unit IV

**Tables and CSS, Links and Images:** Table Elements, formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo Class Selectors, thead and

tbody Elements, Cell Spanning, CSS display Property with Table Values, a Element, Different Types of href Values, Relative URLs, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Positioning Images, Shortcut Icon, iframe Element. Background images, web fonts

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Demonstration of code
- Links: [https://www.w3schools.com/css/css\\_table.asp](https://www.w3schools.com/css/css_table.asp), [https://www.w3schools.com/css/css\\_link.asp](https://www.w3schools.com/css/css_link.asp)

## Unit V

**Introduction to JavaScript:** Functions, DOM, Forms, and Event Handlers History of JavaScript, Hello World Web Page, Buttons, Functions, Variables, Identifiers, Assignment Statements and Objects, Document Object Model, Form Attributes, Form Element, Controls, Text Control, E-mail address generator web page, event-handler

- Pedagogy/Course delivery tools: Chalk and talk, Power Point Presentation, Demonstration of code
- Links: [https://www.w3schools.com/js/js\\_functions.asp](https://www.w3schools.com/js/js_functions.asp)

### Lab Component:

1. Create a web page using HTML to create your biodata that includes personal details (Name, date of birth, Address, contact number, email id), Qualification (10th and 12th marks/grades, with school/college information), List of achievements (Create a link to at least 1 achievement), insert your photo(image).
2. Develop web page for a typical wedding event using List tag. Apply HTML include
  - a. Heading
  - b. Image
  - c. Paragraph
  - d. Ordered list for Groceries, Vegetables of type numbers and alphabets with description
  - e. Unordered list for Fruits, Stationery Items, Flowers of shape circle, square and diamond with description
3. Apply CSS border property to create the following table. Give proper caption for the table and do the following.

Firstname	Lastname	Age
Priya	Sharma	24
Arun	Singh	32
Sam	Watson	41

- a. Left Align the text, border spacing of 5px and cell padding of 15px
  - b. Use row span and Column span
4. Create a web page to create a form using CSS that includes tables and user interface components such as text boxes, text areas, buttons, check boxes and

- combo box. Create a feedback form to enable students to give their feedback regarding the teacher.
5. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country; its capital should be printed next in the list. Add **CSS** to customize the properties of the font of the capital (color, bold and font size).
  6. Design a web page that contains your biodata and personal data. Apply **CSS** to include
    - a. Button features
    - b. Images
    - c. Text
    - d. Pagination
    - e. At least 2 columns of detailed information
  7. Write a **JavaScript** to design a simple calculator to perform the following operations: sum, product, difference and quotient
  8. Write **JS** code to compute factorial of a given number and display the same in the alert box.
  9. Design a web page to enter purchase details with respect to a grocery store. 1. Items purchased 2. Quantity 3. Item Code 4. Item Price  
On click of the submit button display the details in table format. Display the total price paid.
  10. Design a web page to include text boxes for entering 2 numbers and buttons (factorial, prime, Fibonacci, Natural Numbers). Display alert box and change the background of the text box when the user focuses onto the text box. Also, Display the name of the button when the user moves over the buttons. When the button is clicked, perform the required computation and print the result in the web page. Create 3 programs for front end, styling and back end.

### **Text Books:**

1. HTML & CSS: The Complete Reference Thomas A. Powell, Fifth Edition, Tata McGraw Hill (Unit 2)
2. WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, First Edition (Unit 1, 3, 4, 5)

### **Reference Books:**

1. Randy Connolly, Ricardo Hoar, “Fundamentals of Web Development”, 1st Edition, Pearson Education India. (ISBN:978-9332575271)
2. David Sawyer Mcfarland, “JavaScript & jQuery: The Missing Manual”, 1st Edition, O’Reilly/Shroff Publishers & Distributors Pvt Ltd, 2014 (ISBN:978-9351108078)
3. Zak Ruvalcaba Anne Boehm, “Murach’s HTML5 and CSS3”, 3rd Edition, Murachs/Shroff Publishers & Distributors Pvt Ltd, 2016. (ISBN:978-9352133246)

## Course Outcomes (COs):

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

1. Use different HTML tags for web page design. (PO-1, PO-3)
2. Develop web pages using HTML5 constructs (PO-1, PO-3)
3. Design web pages using basic features of CSS and HTML (PO-1, PO-2, PO-3)
4. Apply advanced features of CSS and HTML to create web pages. (PO-1, PO-2, PO-3)
5. Apply features of JavaScript to handle client side interactions. (PO-1, PO-2, PO-3)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal test-I	30	CO1, CO2
Internal test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Lab Component Evaluation	20	CO1, CO2, CO3, CO4, CO5
<b>Semester-End Examination (SEE)</b>	100	CO1, CO2, CO3, CO4, CO5



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# INTRODUCTION TO PYTHON PROGRAMMING

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**Course Code:** PLC142/242

**Credits:** 2:0:1

**Pre-requisites:** Nil

**Contact Hours:** 28L+14P

**Course Coordinators:** Dr. J Geetha & Darshana A Naik

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## Course Content

### Unit I

**The way of the program:** The Python programming language, what is a program? What is debugging? Syntax errors, Runtime errors, Semantic errors, Experimental debugging.

**Variables, Expressions and Statements:** Values and data types, Variables, Variable names and keywords, Conditional Statements, Evaluating expressions, Operators and operands, Type converter functions, Order of operations, Operations on strings, Input, Composition, The modulus operator.

**Iteration:** Assignment, Updating variables, the for loop, the while statement, The Collatz  $3n + 1$  sequence, Nested Loops for Nested Data.

**Functions:** Functions with arguments and return values, Lambda Functions

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: <https://www.learnbyexample.org/python/>  
<https://www.learnpython.org/>  
<https://pythontutor.com/visualize.html#mode=edit>

### Unit II

**Tuples:** Tuples are used for grouping data, Tuple assignment, Tuples as return values, Composability of Data Structures.

**Lists:** List values, Accessing elements, List length, List membership, List operations, List slices, Lists are mutable, List deletion, Objects and references, Aliasing, Cloning lists, Lists and for loops, List parameters, List methods, Pure functions and modifiers, Functions that produce lists, Strings and lists, list and range, Nested lists, Matrices.

**Dictionaries:** Dictionary operations, dictionary methods, aliasing and copying.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: <https://www.learnbyexample.org/python/>  
<https://www.learnpython.org/>  
<https://pythontutor.com/visualize.html#mode=edit>

### Unit III

**Modules:** Random numbers, the time module, the math module, creating your own modules, Namespaces, Scope and lookup rules, Attributes and the dot Operator.

**Files:** About files, writing our first file, Reading a file line-at-a-time, turning a file into a list of lines, Reading the whole file at once, working with binary files, Directories, fetching something from the web. Algorithms: Linear search, Binary search, merging

two sorted lists.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: <https://www.learnbyexample.org/python/>  
<https://www.learnpython.org/>  
<https://pythontutor.com/visualize.html#mode=edit>

## Unit IV

**Object oriented programming:** Classes and Objects — The Basics, Attributes, Adding methods to our class, Instances as arguments and parameters, Converting an instance to a string, Instances as return values, Objects are mutable, Sameness, Copying.

**Inheritance:** Polymorphism, Generalization, Pure functions, Operator Overloading.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: <https://www.learnbyexample.org/python/>  
<https://www.learnpython.org/>  
<https://pythontutor.com/visualize.html#mode=edit>

## Unit V

**Exceptions:** Catching exceptions, Raising our own exceptions, the finally clause of the try statement.

**Strings:** Working with strings as single things, Working with the parts of a string, Length, Traversal and the for loop, Slices, String comparison, Strings are immutable, The in and not in operators, A find function, Looping and counting, Optional parameters, The built-in find method, The split method, Cleaning up your strings, The string format method.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: <https://www.learnbyexample.org/python/>  
<https://www.learnpython.org/>  
<https://pythontutor.com/visualize.html#mode=edit>

## Lab Component:

Sl. No.	QUESTIONS
1	<p>a) Write a python program to read 2 numbers from the keyboard and perform the basic arithmetic operations based on the choice. (1-Add, 2-Subtract, 3-Multiply, 4-Divide)</p> <p>b) Write a python program to find the factorial of number using while loop.</p> <p>c) Write a python program to add 10 numbers by inputting each from the keyboard using for loop.</p>
2	<p>a) Write a python function linearSearch() to read an array and search for the key element. Display the appropriate messages. Use the recursive function.</p> <p>b) Write a python program to define a function max_of_three() that takes three numbers as arguments and returns the largest of them using default arguments.</p> <p>c) Write a python program to define a function generate_n_chars() that takes an integer n and a character c and returns a string, n characters long. For example, generate_n_chars(5,"x") should return the string "xxxxx" using keyword only parameters.</p>

3	<p>a) Write a python program to implement a stack and queue using lists</p> <p>b) Write a python program to create a list of tuples having first element as the strings and the second element as the length of the string. Output the list of tuples sorted based on the length of the string.</p> <p>c) Write a python program to create a list and perform the following operations</p> <ul style="list-style-type: none"> <li>• Inserting an element</li> <li>• Removing an element</li> <li>• Appending an element</li> <li>• Displaying the length of the list</li> <li>• Popping an element</li> <li>• Clearing the list</li> </ul>
4	<p>a) Write a tiny Python program numDict.py that makes a dictionary whose keys are the words 'one', 'two', 'three', and 'four', and whose corresponding values are the numerical equivalents, 1, 2, 3, and 4 (ints, not strings).</p> <p>b) Write a Python program to store PROFILE_DATA(user_id, name, DOB, qualification, work_experience) in a dictionary and pretty print the dictionary contents. (import pprint)</p>
5	<p>a) Write a Python program to demonstrate built-in modules (Random,Time, Math, etc.)</p> <p>b) Create a user defined module using python to execute the following a) area of circle b) area of triangle c) area of rectangle.</p>
6	<p>a) Write a python program to create a text file and ask the user to enter 5-6 lines of text. Display the longest and the shortest word from the file. Display the length of these words.</p> <p>b) Develop a python 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(), readlines(), and write().]</p>
7	<p>a) Develop a python program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use __init__() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.]</p> <p>b) Write a python program for the following:</p> <p>c) Create a class called time. Its three members all type int should be called hours, minutes and seconds. Write a python program that prompts the user to enter a time values separately. The Program should then store the time in the object and finally printout the total no of seconds represented by this value. Use appropriate member functions.</p>
8	<p>a) Write a python program to create a class called Mylist that shadows a python list: it should overload + operator to append the data to the list. Also provide constructor for your class that takes an existing list.</p> <p>b) Write a python program to implement the following using Inheritance</p> <div style="text-align: center;"> <pre> graph TD     Employee --&gt; Clerk     Employee --&gt; Software[Software Engineer]     Software --&gt; Team[Team Leader] </pre> </div>
9	<p>a) Write a python program to Build a Number guessing game. When user enters not an integer raise the Exception and print total number of Guesses.</p> <p>b) Write a python function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a&gt;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.</p>

10	<p>a) Write a python program to implement the following using strings</p> <p>The third person singular verb form in English is distinguished by the suffix -s, which is added to the stem of the infinitive form: run -&gt; runs. A simple set of rules can be given as follows:</p> <ul style="list-style-type: none"> <li>• If the verb ends in y, remove it and add ies</li> <li>• If the verb ends in o, ch, s, sh, x or z, add es</li> <li>• By default just add s</li> <li>• Test your function with words like try, brush, run and fix. Tip: Check out the string method <code>endswith()</code>.</li> </ul> <p>b) Write a python function <code>partition()</code> that splits a list of soccer players into two groups. More precisely, it takes a list of first names (strings) as input and prints the names of those soccer players whose first name starts with a letter between and including A and M.</p> <pre>&gt;&gt;&gt; partition(['Eleanor', 'Evelyn', 'Sammy', 'Owen', 'Gavin']) Eleanor Evelyn Gavin &gt;&gt;&gt; partition(['Xena', 'Sammy', 'Owen'])</pre>
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## Suggested Learning Resources

### Text Books:

1. Downey, A., Elkner, J., & Meyers, C. (2012). How to think like a computer scientist: learning with python. Green Tea Press, Wellesley, Massachusetts.

### Reference Books:

1. Al Sweigart, “Automate the Boring Stuff with Python”, 1stEdition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at <https://automatetheboringstuff.com/>)  
(Chapters 1 to 18, except 12) for lambda functions use this link: <https://www.learnbyexample.org/python-lambda-function/>
2. Allen B. Downey, “Think Python: How to Think Like a Computer Scientist”, 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at <http://greenteapress.com/thinkpython2/thinkpython2.pdf>)  
(Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

### Course Outcomes (COs):

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

1. Demonstrate proficiency in handling loops and creation of functions
2. Identify the methods to create and manipulate lists, tuples and dictionaries.
3. Develop programs using modules and files.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Demonstrate the use of built-in functions for string processing and exception handling.

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal test-I	30	CO1, CO2
Internal test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Lab Component Evaluation	20	CO1, CO2, CO3, CO4, CO5
<b>Semester-End Examination (SEE)</b>	100	CO1, CO2, CO3, CO4, CO5

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## **BASICS OF JAVA PROGRAMMING**

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**Course Code: PLC143/243**

**Credits: 2:0:1**

**Pre-requisites: Nil**

**Contact Hours: 28L+14P**

**Course Coordinator: Dr. Yogish H K**

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### **Course Content**

#### **Unit I**

An Overview of Java: Introduction to Object-Oriented Programming, Simple Java Programs, identifiers, literals, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, Variables, Arrays, and Strings.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Links: <https://pythontutor.com/visualize.html#mode=edit>

#### **Unit II**

Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ?: Operator, Operator Precedence, Control Statements: Java's Selection Statements - if, if-else, nested if else, if else ladder, Iteration Statements – while, do-while, for, for-each, nested loops, Jump Statements – break, continue, return.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Links: <https://pythontutor.com/visualize.html#mode=edit>

#### **Unit III**

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

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Links: <https://pythontutor.com/visualize.html#mode=edit>

#### **Unit IV**

Inheritance: Inheritance, using super, creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Links: <https://pythontutor.com/visualize.html#mode=edit>

#### **Unit V**

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces,

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation
- Links: <https://pythontutor.com/visualize.html#mode=edit>

## Lab Component:

1. Java Program to demonstrate arithmetic operators, relational operators and bitwise operators.
2. Java Program to find the largest and smallest of three numbers using a ternary operator.
3. Write a Java program to find Fibonacci series, using while and for loop.
4. Write a Java program to calculate a Factorial of a number
5. Write a java program to check if a given number is palindrome.
6. ATM program Java- representing ATM transactions such as withdraw the money, deposit the money, check the balance, and exit using switch statement.
7. Java Program to print the largest element in an array.
8. Java Program to Add Two Matrices
9. Write a Java program to implement a linear Search Algorithm.
10. Write a JAVA program to add two complex numbers using Class.
11. Create a JAVA class called Student with the following details as variables within it. USN, NAME, BRANCH, PHONE, PERCENTAGE, Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.
12. Write a JAVA program demonstrating Method overloading and Constructor overloading.
13. Find the area of the rectangle using constructors and method area().
14. Write a Java program to demonstrate the finalize() method that helps in garbage collection.
15. 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.
16. Java Program to demonstrate the uses of super.
17. Describe the abstract class called shape, which has three subclasses say triangle, rectangle and circle. Define one method area() in abstract class and override this area() in these three subclasses to calculate areas of triangle, rectangle and circle.
18. 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 ArrayIndexOutOfBoundsException.
19. Write a JAVA program demonstrating finally block for handling exceptions.
20. Java program to implement multiple inheritance.

### **Text Books:**

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

### **Reference Books:**

1. Bruce Eckel, Thinking in Java, 4th Edition, Tata McGraw Hill

### **Course Outcomes (COs):**

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

1. Understand Object Oriented Programming Concepts (PO-1)
2. Apply Java programming constructs to solve the given problems (PO-1, PO-2, PO-3)
3. Apply the concept of Classes and Objects to solve the given problems. (PO-1, PO-2, PO-3)
4. Use the concepts of polymorphism and inheritance to solve the given problems. (PO-1, PO-2, PO-3)
5. Design the solutions for the given real world problems using concepts of packages, interfaces and Exception Handling. (PO-1, PO-2, PO-3)

### **Course Assessment and Evaluation:**

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal test-I	30	CO1, CO4
Internal test-II	30	CO2, CO3, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Lab Component Evaluation	20	CO1, CO2, CO3, CO4, CO5
<b>Semester-End Examination (SEE)</b>	100	CO1, CO2, CO3, CO4, CO5



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# INTRODUCTION TO C++ PROGRAMMING

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Course Code: PLC144/244

Credits: 2:0:1

Pre-requisites: Nil

Contact Hours: 28+14

Course Coordinator: Ashwitha A

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## Course Content

### Unit I

**Introduction to Object Oriented Programming:** Computer programming background, C++ overview. First C++ Program, Basic C++ syntax, Object Oriented Programming: What is an object, Classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link: Basics of C++ - <https://www.youtube.com/watch?v=BCIS40yzssA>  
Functions of C++ - <https://www.youtube.com/watch?v=p8ehAjZWjPw>

### Unit II

**Tokens, Expressions and Control Structures, Array in C++:** Tokens, Keywords, Identifiers and constants, Operators in C++, Scope resolution operator Expressions and their types, Special assignment expressions, Decision making statements: if, if-else, switch, Loops: while loop, do-while loop, for loop, Array: Introduction, initializing single dimension array, Linear search operation on array elements.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Link : Basics of C++ - <https://www.youtube.com/watch?v=BCIS40yzssA>  
Functions of C++ - <https://www.youtube.com/watch?v=p8ehAjZWjPw>

### Unit III

**Functions In C++:** Function prototyping, Call by Value, Call by reference, Return by reference Inline functions, Default arguments, Function overloading.

**Inheritance & Polymorphism:** Derived class Constructors, Destructors, Types of Inheritance Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Links: Basics of C++ - <https://www.youtube.com/watch?v=BCIS40yzssA>  
Functions of C++ - <https://www.youtube.com/watch?v=p8ehAjZWjPw>

### Unit IV

**I/O Streams:** C++ Class Hierarchy, File Stream, Text File handling, Binary File handling during file operations.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Links: Basics of C++ - <https://www.youtube.com/watch?v=BCIS40yzssA>  
Functions of C++ - <https://www.youtube.com/watch?v=p8ehAjZWjPw>

## Unit V

**Exception Handling:** Introduction to Exception, Benefits of Exception handling, Try and catch block Throw statement, Pre-defined exceptions in C++.

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, Videos
- Links: Basics of C++ - <https://www.youtube.com/watch?v=BCIS40yzsSA>  
Functions of C++ - <https://www.youtube.com/watch?v=p8ehAjZWjPw>

### Lab Component:

SL. No.	QUESTIONS
1	<ol style="list-style-type: none"><li>Write a C++ program to find the area and circumference of a circle</li><li>Write a C++ program to find the simple interest</li><li>Write a C++ program to find the area of a triangle given its sides</li><li>Write a C++ program to get the name, age and salary of a person and display the same.</li></ol>
2	<ol style="list-style-type: none"><li>Write a C++ program to find the factorial of a number</li><li>Write a C++ program to find whether the entered number is palindrome or not.</li><li>Write a C++ program to find the sum of all the natural numbers from 1 to n.</li><li>Write a C++ program to find sum of all the elements, maximum and minimum element in an array</li></ol>
3	<ol style="list-style-type: none"><li>Write a C++ program to search an element in an array using linear search</li><li>Write a C++ program to find whether an entered number is prime or not using a function (with value, with return type)</li><li>Write a C++ program to swap 2 values by writing a function that uses call by reference technique.</li></ol>
4	<ol style="list-style-type: none"><li>Write a C++ program to overload function for computing the area triangle, circle and square</li><li>Write a C++ program to overload a function to add two numbers of different data types (int, float, double)</li></ol>
5	<ol style="list-style-type: none"><li>Write a C++ program to perform square of a number using inline function</li><li>Write a C++ program to create a class called bank_acct with following data member (cust_name, cust_acno, balance) and member functions (read_details, deposit, withdraw, display balance). Read and display details using array of objects and implement deposit and withdraw using inline.</li></ol>
6	<ol style="list-style-type: none"><li>Write and execute a C++ Program to display names, roll no's, and grades of 3 students who have appeared in the examination. Create a class with data members as Name, Roll no and Marks for 3 subjects. Write a method to calculate the grade of a student.</li><li>Create a C++ class that includes constructors to do the following.<ul style="list-style-type: none"><li>• Create an uninitialized string.</li><li>• Initialize an object with a string constant at the time of creation.</li><li>• Create an object and initialize with another object. Also write a function to concatenate two strings.</li></ul></li></ol>

7	<p>a) Write a C++ program to implement the following inheritance.</p> <div style="text-align: center;"> <pre> classDiagram     Person &lt; -- Teacher     Person &lt; -- Student     Student --&gt; Marks           </pre> </div> <ul style="list-style-type: none"> <li>• Assume suitable data members and member functions for all the classes.</li> <li>• Display the number of publications for a teacher and percentage marks for a student.</li> </ul>
8	<p>Write a C++ program to demonstrate multilevel inheritance for the following:          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</p>
9	<p>a) Write a C++ program to create a text file, check file created or not, if created it will write some text into the file and then read the text from the file.          b) Write a C++ program to read the contents from a text file, count and display the number of alphabets present in it.</p>
10	<p>a) Write a program that creates a Calculator class. The class contains two variables of integer type. Design a constructor that accepts two values as parameter and set those values.</p> <ul style="list-style-type: none"> <li>• Design four methods named Add (), Subtract (), multiply (), Division () for performing addition, subtraction, multiplication and division of two numbers.</li> <li>• For addition and subtraction, two numbers should be positive. If any negative number is entered then throw an exception in respective methods. So design an exception handler (ArithmeticException) in Add () and Subtract () methods respectively to check whether any number is negative or not.</li> <li>• For division and multiplication two numbers should not be zero. If zero is entered for any number then throw an exception in respective methods. So design an exception handler (ArithmeticException) in multiply () and Division () methods respectively to check whether any number is zero or not.</li> </ul>

### Text Books:

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

## Course Outcomes (COs):

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

1. Explain the characteristics of Object oriented programming approach.
2. Develop programs based on decision making statements and arrays.
3. Achieve code reusability and extensibility by means of Inheritance and Polymorphism.
4. Demonstrate C++ functions to perform operations on a file.
5. Illustrate the use of Exception handling feature in C++ for handling errors at runtime.

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal test-I	30	CO1, CO2
Internal test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Lab Component Evaluation	20	CO1, CO2, CO3, CO4, CO5
<b>Semester-End Examination (SEE)</b>	100	CO1, CO2, CO3, CO4, CO5

# **EMERGING TECHNOLOGY COURSES (ETC)**

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## GREEN BUILDINGS

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Course Code: ETC141/241

Credits: 3:0:0

Pre-requisites: Nil

Contact Hours: 42L

Course Coordinator: Dr. Anil Kumar R

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### Course Content

#### Unit I

**Introduction to the concept of cost-effective construction** - Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Pozzolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials

• Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation

• Links:<https://recyclecoach.com/blog/how-to-reuse-and-recycle-construction-materials/>

<https://theconstructor.org/building/quarrying-of-stones-construction-works/17284/>

**Self Study:** Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to Quarrying of building materials

#### Unit II

**Environment friendly and cost-effective Building Technologies** - Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic. Contributions of agencies- Costford- Nirmithi Kendra- Habitat

• Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation

• Link for Septic tanks: <https://www.dtox.org/blog/what-is-a-septic-tank-and-how-does-it-work>

#### Unit III

**Global Warming** – Definition - Causes and Effects - Contribution of Buildings towards Global Warming – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials. Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.

• Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation

• Link for Global warming: <https://www.nrdc.org/stories/global-warming-101>

• Link for Carbon footprint: <https://www.nature.org/en-us/get-involved/how-to-help/carbon-footprint-calculator/>

**Self Study:** Carbon Footprint – Global Efforts to reduce carbon Emissions Green Buildings.

## Unit IV

**Green Building rating Systems - BREEAM – LEED - GREEN STAR -GRIHA** (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weightage. Green Design – Definition - Principles of sustainable development in Building Design – Sustainably managed materials- Integrated Lifecycle design of Materials and Structures (concepts only)

- Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation
- Link for Rating systems: <https://www.cedengineering.com/userfiles/Leed%20Rating%20System.pdf>
- Link for sustainable buildings: <https://www.mapleridge.ca/1780/Sustainable-Building-Features>

**Self Study:** Characteristics of Sustainable Buildings

## Unit V

### Utility of Solar Energy in Buildings

Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Case studies of Solar Passive Cooled and Heated Buildings.

### Green Composites for Buildings

Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage.

- Pedagogy / Course delivery tools: Chalk and talk, Powerpoint Presentation
- Link for low energy cooling: <https://www.atamate.com/atamate-blog/passive-cooling-for-low-energy-buildings>  
<https://www.gdrc.org/uem/green-const/index.html>

**Self Study:** Low Energy Cooling, Urban Environment and Green Buildings. Green & Built environment

### Text Books:

1. HarharaIyer G, Green Building Fundamentals, Notion Press
2. Dr. Adv. HarshulSavla, Green Building: Principles & Practices
3. Kibert, Charles J. Sustainable construction: green building design and delivery, Wiley, 2008. 2nd Edition.
4. TERI “Sustainable Building Design Manual- Volume I & II” Tata Energy Research Institute.

## Reference Books:

1. Prof. Dr. Michael Bauer, Peter Mösle and Dr. Michael Schwarz (2010) “Green Building –Guide book for Sustainable Architecture” Springer.
2. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison (2001) “Green Building Handbook” Volume1-Spon Press.
3. Mili Majumdar,(2002) “Energy-efficient buildings in India” Tata Energy Research Institute.

## Web links & Video Lectures

- <https://www.youtube.com/watch?v=THgQF8zHBW8>
- [https://www.youtube.com/watch?v=DRO\\_rIkywXQ](https://www.youtube.com/watch?v=DRO_rIkywXQ)

## Course Outcomes (COs):

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

1. Select different building materials for construction
2. Apply effective environmental friendly building technology
3. Analyze global warming due to different materials in construction
4. Analyse buildings for green rating
5. Use alternate source of energy and effective use water

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Assessment-I	30	CO1, CO2, CO3
Internal Assessment-II	30	CO3, CO4, CO5
Average of the two internal tests will be taken for 30marks		
<b>Other Components</b>		
Assignment	10	CO1, CO2
Assignment	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100	CO1, CO2, CO3, CO4, CO5



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# OPERATION AND MAINTENANCE OF SOLAR ELECTRIC SYSTEMS

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**Course Code:** ETC142/242

**Credits:** 3:0:0

**Pre-requisites:** Nil

**Contact Hours:** 42L

**Course Coordinator:** Dr. Hemachandra Gudimindla

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## Course Content

### Unit I

**Solar Resource and Radiation:** Solar resources, Quantifying solar radiation, The effect of the Earth's atmosphere on solar radiation, Sun geometry, Geometry for installing solar arrays.

**PV Industry and Technology:** Semiconductor devices, Mainstream technologies, Monocrystalline silicon, M multi-crystalline/polycrystalline silicon, Thin film solar cells, Contacts, Buying solar modules, Standards, Certifications, Warranties, Emerging technologies, Dye-sensitized solar cells, Sliver cells, Heterojunction with an intrinsic thin layer (HIT) photovoltaic cells, III-V Semiconductors, Solar concentrators.

**PV Cells, Modules and Arrays:** Characteristics of PV cells, Graphic representations of PV cell performance, Connecting PV cells to create a module, Specification sheets, Creating a string of modules, Creating an array, Photovoltaic array performance, Irradiance, Temperature, Shading.

### Unit II

**Inverters and Other System Components:** Introduction, Inverters, Battery inverters, Grid interactive inverters, Transformers, Mainstream inverter technologies, String inverters, Multi-string inverters, Central inverter, Modular inverters, Inverter protection systems, Self-protection, Grid protection, Balance of system equipment: System equipment excluding the PV array and inverter, Cabling, PV combiner box, Module junction box, Circuit breakers and fuses, PV main disconnects/isolators, Lightning and surge protection, System monitoring, Metering, Net metering, Gross metering. Mounting Systems: Roof mounting systems, Pitched roof mounts, Pitched roof mounts for tiled roofs, Pitched roof mounts for metal roofs, Rack mounts, Direct mounts, Building-integrated systems, Ground mounting systems, Ground rack mounts, Pole mounts, Sun-tracking systems, Wind loading, Lightning protection.

### Unit III

**Site Assessment:** Location of the PV array, Roof specifications, Is the site shade-free? Solar Pathfinder, Solmetric Suneye, HORI catcher, iPhone apps, Software packages, Available area, Portrait installation, Landscape installation, Energy efficiency initiatives, Health, safety and environment (HSE) risks, Local environment, Locating balance of system equipment, Site plan.

**Designing Grid-connected PV Systems:** Design brief, Existing system evaluation, choosing system components, Modules, Mounting structure, Inverters, Cabling, Voltage sizing, Current sizing, Monitoring, System protection, Over-current protection, Fault-current protection, Lightning and surge protection, Grounding/earthing, Mechanical protection, Array protection, Subarray protection, Extra low voltage (ELV) segmentation.

**Sizing a PV System:** Introduction, Matching voltage specifications, Calculating maximum voltage, Calculating minimum voltage, Calculating the minimum number of modules in a string, Calculating the maximum voltage, Calculating the maximum number of modules in a string, Calculating the minimum voltage, Calculating the minimum number of modules in a string, Matching current specifications, Matching modules to the inverter's power rating, Losses in utility-interactive PV systems, Temperature of the PV module, Dirt and soiling, Manufacturer's tolerance, Shading, Orientation and module tilt angle, Voltage drop, Inverter efficiency, Calculating system yield.

## Unit IV

**Installing Grid-connected PV Systems:** PV array installation, DC wiring, Cabling routes and required lengths, Cable sizing, PV combiner box, System grounding/earthing, Inverter installation, Installation checklist, Interconnection with the utility grid, Required information for installation, Safety.

**System Commissioning:** Introduction, Final inspection of system installation, Testing, Commissioning, System documentation.

**System Operation and Maintenance:** System maintenance, PV array maintenance, Inverter maintenance, System integrity, Troubleshooting, Identifying the problem, Troubleshooting PV arrays, Troubleshooting underperforming systems, Troubleshooting inverters, Other common problems.

## Unit V

**Marketing and Economics of Grid-connected PV Systems:** Introduction, PV system costing, Valuing a PV system, Simple payback and financial incentives, Simple payback, Feed-in tariffs, Rebates, Tax incentives, Loans, Renewable portfolio standards and renewable energy certificates, Marketing, Insurance.

### Text Book:

1. Geoff Stapleton and Susan Neill, Grid-connected Solar Electric Systems, The Earthscan Expert Handbook for Planning, Design and Installation, Earthscan, 1st Edition, 2012

## **Course outcomes (COs):**

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

1. Apprehend solar systems and PV Technology
2. Realize Inverter components, cabling and protection
3. Select the site and size of Grid-connected PV systems.
4. Recognize Installation, Commissioning, Operation & Maintenance of Grid Connected PV systems
5. Know the Marketing and Economics of Grid-connected PV systems.

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# INTRODUCTION TO SUSTAINABLE ENGINEERING

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Course Code: ETC143/243

Credits: 3:0:0

Pre-requisites: Nil

Contact Hours: 42L

Course Coordinator: Dr. Ramasivakiran Reddy

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## Course Content

### Unit I

**Sustainable Development and Role of Engineers:** Introduction, Why and What is Sustainable Development, THE SDFs, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering

**Sustainable Engineering Concepts:** Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/127105018>  
<https://nptel.ac.in/courses/107103081>

### Unit II

**Sustainable Engineering and Concepts, Principles and Frame Work:** Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering.

**Tools for sustainability Assessment:** Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/127105018>  
<https://nptel.ac.in/courses/107103081>

### Unit III

**Fundamentals of Life Cycle Assessment**

Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological Choices, LCI Databases and LCA Softwares, OpenLCA, Strength and Limitations of LCA.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/127105018>  
<https://nptel.ac.in/courses/107103081>

### Unit IV

**Environmental Life Cycle Costing, Social Life Cycle Assessment, and Life Cycle Sustainability Assessment:** Introduction, Environmental Life Cycle Costing, Social

Life Cycle Assessment, Life Cycle Sustainability, LCA Applications in Engineering, Environmental Economics

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/127105018>  
<https://nptel.ac.in/courses/107103081>

## Unit V

**Integrating Sustainability in Engineering Design:** Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/127105018>  
<https://nptel.ac.in/courses/107103081>

### Text Books:

1. Introduction to Sustainability for Engineers, Toolseeram, Ramjeawon, CRC Press, 1<sup>st</sup> Edn., 2020
2. Shaked, S., Crettaz, P., Saade-Sbeih, M., Jolliet, O., & Jolliet, A. (2015). Environmental life cycle assessment. CRC Press.

### Reference Books:

1. Sustainability Engineering: Concepts, Design and Case studies, Prentice Hall, 1<sup>st</sup> Edn, 2015
2. System Analysis for sustainable Engineering: Theory and applications, Ni bin Chang, McGraw Hill Publications, 1<sup>st</sup> Edn., 2010
3. Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1<sup>st</sup> Edn., 2021
4. Introduction to Sustainable Engineering, Rag. R.L. and Ramesh Lakshmi Dinachandran, PHI Learning Pvt. Ltd., 2<sup>nd</sup> Edn, 2016

### Course Outcomes (COs):

On successful completion of the course students will be able to

1. Understanding Sustainable Development. (PO-1, PO-7, PO-6, PSO-1)
2. Solving sustainability problems with available tools and techniques. (PO-1, PO-7, PO-6, PSO-1)
3. Understanding fundamentals of life cycle assessment. (PO-1, PO-7, PO-6, PO-12, PSO-1)
4. Understanding sustainability costing and economics. (PO-1, PO-7, PO-6, PO-12, PSO-1)
5. Developing sustainable management system. (PO-1, PO-7, PO-6, PSO-1)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Assignment/Mini Project	10	CO1, CO2, CO3, CO4, CO5
Quiz/Presentations	10	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

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# RENEWABLE ENERGY SOURCES

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Course Code: : ETC144/244

Credits: 3:0:0

Pre-requisites: Nil

Contact Hours: 42L

Course Coordinators: Vinayak Talugeri and Gururaj

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## Course Content

The Students shall:

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

### Unit I

**Introduction:** Principles of renewable energy; energy and sustainable development, fundamentals and social implications, renewable energy availability in India, applications of renewable energy, Introduction to Internet of energy (IOE).

- Pedagogy/Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: NCES lab
- Links: Introduction of renewable energy: <https://www.youtube.com/watch?v=A2KvSLoonGs>
- Links: Introduction to Internet of energy (IOE): <https://www.youtube.com/watch?v=jnf-aM197I0>

### Unit II

**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.

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation
- Lab component/Practical topics: NCES lab
- Links: Solar radiation Measurements: <https://www.youtube.com/watch?v=PmkbJx1jdV4>
- Links: Solar cell: <https://www.youtube.com/watch?v=mCgXsEyQZSI>

### Unit-III

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

**Biomass Energy:** Introduction; Photosynthesis Process; Biofuels; Biomass Resources;

Biomass conversion technologies -fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft).

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos,
- Lab component/Practical topics: NCES lab
- Links: Wind energy: <https://www.youtube.com/watch?v=f0p0Fria5TY>
- Links: Biomass energy: [https://www.youtube.com/watch?v=5cQD\\_xZph9U](https://www.youtube.com/watch?v=5cQD_xZph9U)

## Unit IV

**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.

**Geothermal Energy Conversion:** Principle of working, Geothermal sources, problems associated with geothermal energy conversion, advantages and limitations.

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation, animated videos
- Lab component/Practical topics: NCES lab
- Links: Tidal energy: <https://www.youtube.com/watch?v=pnK5rv5PoSU>
- Links: OTEC energy: <https://www.youtube.com/watch?v=ala3ruvZMho>

## Unit V

**Green Energy:** Introduction, Fuel cells: Classification of fuel cells – H<sub>2</sub>; Operating principles, Zero energy Concepts. Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy.

- Pedagogy/ Course delivery tools: Chalk and talk, Power point presentation,
- Lab component/Practical topics: NCES lab
- Links: Fuel cells: <https://www.youtube.com/watch?v=6oeN9VDFLig&t=3s>
- Links: Hydrogen energy: <https://www.youtube.com/watch?v=LdRelOJKMCs>

### Text Books:

1. **Nonconventional Energy sources**, G D Rai, Khanna Publication, Fourth Edition.
2. **Energy Technology**, S.Rao and Dr. B.B. Parulekar, Khanna Publication. Solar energy, Subhas P Sukhatme, Tata McGraw Hill, 2<sup>nd</sup> Edition, 1996

### Reference Books:

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

### Web links and video lectures (e-Resources)

- <https://www.pdfdrive.com/non-conventional-energy-sources-e10086374.html>
- <https://www.pdfdrive.com/non-conventional-energy-systems-nptel-d17376903.html>



- <https://www.pdfdrive.com/renewable-energy-sources-and-their-applications-e33423592.html>
- <https://www.pdfdrive.com/lecture-notes-on-renewable-energy-sources-e34339149.html>
- <https://onlinecourses.nptel.ac.in/noc18ge09/preview>

### **Course Outcomes (COs):**

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

1. Identify the various sources of renewable energy sources and their applications.
2. Understand the working principles of solar energy extraction and its measurements.
3. Describe the classifications, energy conversion and problems associated with wind energy and Biomass energy.
4. Recognize the energy harvesting of Tidal energy, OTEC and geothermal energy.
5. Understand the operation of fuel cell and hydrogen energy extraction.

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## INTRODUCTION TO INTERNET OF THINGS (IoT)

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Course Code: : ETC145/245

Credits: 3:0:0

Pre-requisites: Nil

Contact Hours: 42L

Course Coordinators: Dr Shobha K R, Dr Neelamsetti Kiran Kumar & Akshatha Kori

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### Course Content

#### Unit I

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

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

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31>

#### Unit II

**IoT Sensing and Actuation:** Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31>

#### Unit III

**IoT Processing Topologies and Types:** Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design, Selection Considerations, Processing Offloading.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31>

#### Unit IV

##### Associated IoT technologies

**Cloud Computing:** Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.

**IoT Case Studies:** Agricultural IoT – Introduction and Case Studies

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31>

#### Unit V

**IoT Case Studies And Future Trends:** Vehicular IoT – Introduction, Healthcare IoT – Introduction, Case Studies, IoT Analytics – Introduction

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31>

### **Text Books:**

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

### **Reference Books:**

1. Waher, Peter. Mastering the Internet of Things. 1<sup>st</sup> ed. Packt Publishing, 2018. Web. 14 Oct. 2022.
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, By David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry Published Jun 13, 2017, by, Cisco Press. Part of the Fundamentals series.
3. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
4. Vijay Madiseti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, 1<sup>st</sup> Edition, VPT, 2014.
5. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1<sup>st</sup> Edition, Apress Publications, 2013.

### **Web links and video lectures (e-Resources)**

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

### **Course Outcomes (COs):**

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

1. Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT. (PO-1, PO-2, PO-3, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)
2. Understand various sensing devices and actuators. (PO-1, PO-2, PO-3, PO-6, PO-7, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)
3. Demonstrate the various processing techniques used in IoT. (PO-1, PO-2, PO-3, PO-6, PO-7, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)
4. Explain Associated IoT Technologies. (PO-1, PO-2, PO-3, PO-6, PO-7, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)
5. Illustrate and analyze the requirements of various IoT Applications. (PO-1, PO-2, PO-3, PO-6, PO-7, PO-9, PO-11, PO-12, PSO-1, PSO-2, PSO-3)

## Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2, CO3
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Assignment/Quiz	10	CO1, CO2, CO3, CO4, CO5
Mini Project	10	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

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# INTRODUCTION TO CYBER SECURITY

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**Course Code:** ETC146/246

**Credits:** 3:0:0

**Pre-requisites:** Nil

**Contact Hours:** 42L

**Course Coordinator:** C Sharmila Suttur

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## Course Content

### Unit I

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

- Pedagogy/Course delivery tools: Chalk and talk
- Links: [https://onlinecourses.swayam2.ac.in/nou19\\_cs08/preview](https://onlinecourses.swayam2.ac.in/nou19_cs08/preview)

### Unit II

**Cyber offenses:** How Criminals Plan Them: Introduction, How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cybercafe and Cybercrimes.

**Botnets:** The Fuel for Cybercrime, Attack Vector.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: [https://onlinecourses.swayam2.ac.in/nou19\\_cs08/preview](https://onlinecourses.swayam2.ac.in/nou19_cs08/preview)

### Unit III

**Tools and Methods Used in Cybercrime:** Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDOS Attacks, Attacks on Wireless networks.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: [https://onlinecourses.swayam2.ac.in/nou19\\_cs08/preview](https://onlinecourses.swayam2.ac.in/nou19_cs08/preview)

### Unit IV

**Phishing and Identity Theft:** Introduction, Methods of Phishing, Phishing Techniques, Spear Phishing, Types of Phishing Scams, Phishing Toolkits and Spy Phishing, Phishing Countermeasures, Identity Theft (ID Theft)

- Pedagogy/Course delivery tools: Chalk and talk
- Links: [https://onlinecourses.swayam2.ac.in/nou19\\_cs08/preview](https://onlinecourses.swayam2.ac.in/nou19_cs08/preview)

### Unit V

**Understanding Computer Forensics:** Introduction, Historical Background of Cyberforensics, Digital Forensics Science, The Need for Computer Forensics, Cyberforensics and Digital Evidence, Digital Forensics Life cycle, Chain of Custody Concept, Network Forensics.

- Pedagogy/Course delivery tools: Chalk and talk
- Links: [https://onlinecourses.swayam2.ac.in/nou19\\_cs08/preview](https://onlinecourses.swayam2.ac.in/nou19_cs08/preview)

### Text Book:

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

### Reference Book:

1. Thomas J. Mowbray, “Cybersecurity: Managing Systems, Conducting Testing, and Investigations”, John Wiley & Sons, ISBN: 978-1-118-69711-5, 2014.

### Course Outcomes (COs):

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

1. Explain the Cybercrime Terminologies. (PO-3, PO-6, PO-8)
2. Describe Cyber offenses and Botnets. (PO-3, PO-6, PO-8)
3. Illustrate Tools and Methods used in Cybercrime. (PO-5, PO-6, PO-8)
4. Explain Phishing and Identity Theft. (PO-3, PO-6, PO-8)
5. Justify the Need of Computer Forensics. (PO-3, PO-6, PO-8)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes attained</b>
Internal Test-I	30	CO1, CO2
Internal Test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other Components</b>		
Quiz	10	CO1, CO2
Assignment	10	CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100 (Scale down to 50 Marks)	CO1, CO2, CO3, CO4, CO5

## Notes

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