ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ಪಟಿಯು ಅಧಿನಿಯಮ ೧೯೯೪"ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ಜ್ಞಾನ ಸಂಗಮ", ಬೆಳಗಾವಿ-೫೯೦೦೧೮, ಕರ್ನಾಟಕ, ಭಾರತ

Visvesvaraya Technological University
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama" Belagavi-590018, Karnataka, India
Phone: (0831) 2498100, Fax: (0831) 2405467, Website: vtu.ac.in

Dr. A. S. Deshpande B.E., M.Tech., Ph.D.
Registrar

Phone: (0831) 2498100
Fax: (0831) 2405467

Ref: VTU/BGM/BOS/A9/2021-22 / 3991

Date: 03 DEC 2021

CIRCULAR

Subject: 1st and 2nd -semester scheme(2021) of Teaching and Examinations regarding...

Reference: Hon'ble Vice-Chancellor's approval dated: 03.12.2021

The courses, 21IDT19- Innovation and Design Thinking (offered in 1st semester both for chemistry and physics groups) and 21SFH29- Scientific Foundations of Health (offered in 2nd semester both for chemistry and physics group) are compulsory courses for the students admitting to 1st year B.E./B.Tech. programs.

A slight modification is made in the scheme of teaching and examinations to offer both the courses in 1st as well as 2ndsemester for 50:50 strength of intake. The scheme is attached with this circular for reference and needful. Also, 3-8 semesters scheme template has been attached for stakeholder's information.

All the principals of Engineering Colleges are hereby informed to bring the content of this circular to the notice of the concerned. Please note: corrected scheme of programs is made available @ **https://vtu.ac.in/en/b-e-scheme-syllabus/#menu05**

Sd/-

Registrar

Encl: As mentioned above.

To,

- All the Principals of the Engineering Colleges under the ambit of VTU Belagavi.

Copy to:

1. The Hon'ble Vice-Chancellor through the secretary to VC for information
2. The Registrar(Evaluation) for information and needful
3. The Registrar's Office, VTU, Belagavi, for information.
4. The Special Officer, Academic Section, VTU Belagavi, for information.
5. The Director ITI SMU CNC for information and to upload the circular on the VTU web portal

REGISTRAR

Visvesvaraya Technological University, Belagavi

Scheme of Teaching and Examinations 2021

Outcome-Based Education(OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2021 – 22)

I Semester (Physics Group) **[Common to all B.E./B.Tech. Programs]**

Sl. No	Course and Course Code		Course Title	Teaching Department (TD)and Paper Setting Board(PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	BSC	21MAT11	**Calculus & Differential Equations**	TD and PSB: Mathematics	2	2	--		03	50	50	100	3
2	BSC	21PHY12	Engineering Physics	TD and PSB: Physics	2	2	--		03	50	50	100	3
3	ESC	21ELE13	Basic Electrical Engineering	TD and PSB: E and E Engineering	2	2	--		03	50	50	100	3
4	ESC	21CIV14	Elements of Civil Engineering and Mechanics	TD and PSB: Civil Engineering	3	--	--		03	50	50	100	3
5	ESC	21EVN 15	Engineering Visualization	TD: ME, Auto, IP, IEM, Mfg. Engineering PSB: Mechanical Engg	2	--	2		03	50	50	100	3
6	BSC	21PHYL16	Engineering Physics Laboratory	TD and PSB: Physics	--	--	2		03	50	50	100	1
7	ESC	21ELEL17	Basic Electrical Engineering Laboratory	TD and PSB: E and E Engineering	--	--	2		03	50	50	100	1
8	HSMC	21EGH18	Communicative English	TD and PSB: Humanities	1	1	1		02	50	50	100	2
9	AEC	21IDT19/29	Innovation and Design Thinking	Any Engineering Department	1	--	--		01	50	50	100	1
		OR											
		21SFH19/29	Scientific Foundations of Health										
TOTAL					**13**	**07**	**07**		**24**	**450**	**450**	**900**	**20**

Note: BSC: Basic Science Course, **ESC**: Engineering Science Course, **HSMC**: Humanity and Social Science & Management Courses, **AEC** –Ability Enhancement Courses.

L –Lecture**, T –** Tutorial, **P-** Practical/ Drawing, **S –** Self Study Component, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Examination	
Credit definition: 1hour Lecture **(L)** per week = **1 Credit** 2 hours Tutorial **(T)** per week = **1 Credit** 2 hours Practical /Drawing (P) per week = **1 Credit**	(a) **Four-credit** courses are to be designed for **50** hours of Teaching-Learning process. (b) **Three credit** courses are to be designed for **40** hours of Teaching-Learning process. (c) **Two credit** courses are to be designed for **25** hours of Teaching-Learning process. (d) **One-credit** courses are to be designed for **15** hours of Teaching-Learning process.

AICTE Activity Points to be earned by students admitted to BE/B.Tech., /B.Plan day college programme (For more details refer to Chapter 6,AICTE Activity Point Programme, Model Internship Guidelines):

Over and above the academic grades, every Day College regular student admitted to the 4 years Degree programme and every student entering 4 years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE ActivityPoint Programme. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry toVTU. The Activity Points earned shall be reflected on the student's eighth semester Grade Card.

The activities can be spread over the years, anytime during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. 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.

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Visvesvaraya Technological University, Belagavi

Scheme of Teaching and Examinations 2021

Outcome-Based Education(OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2021 – 22)

II Semester (For students who attended I semester under Physics Group) **[Common to all B.E./B.Tech Programs]**

Sl. No	Course and Course Code		Course Title	Teaching Department(TD) and Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	BSC	21MAT21	Advanced Calculus and Numerical Methods	TD and PSB: Mathematics	2	2	--		03	50	50	100	3
2	BSC	21CHE22	Engineering Chemistry	TD and PSB: Chemistry	2	2	--		03	50	50	100	3
3	ESC	21PSP23	Problem-Solving through Programming	TD and PSB: Computer Science and Engineering	2	2	--		03	50	50	100	3
4	ESC	21ELN24	Basic Electronics & Communication Engineering	TD: ECE/E and I/ TCPSB: ECE	2	2	--		03	50	50	100	3
5	ESC	21EME25	Elements of Mechanical Engineering	TD: ME, Auto, IP,IEM, Mfg . Engineering PSB: Mechanical Engg	2	--	2		03	50	50	100	3
6	BSC	21CHEL26	Engineering Chemistry Laboratory	TD and PSB: Chemistry	--	--	2		03	50	50	100	1
7	ESC	21CPL27	Computer Programming Laboratory	TD and PSB: Computer Science and Engineering	--	--	2		03	50	50	100	1
8	HSMC	21EGH28	Professional Writing Skills in English	TD and PSB: Humanities	1	1	1		02	50	50	100	2
9	AEC	21SFH19/29	Scientific Foundations of Health	Any Department	1	--	--		01	50	50	100	1
		OR											
		21IDT19/29	Innovation and Design Thinking										
				TOTAL	**13**	**09**	**07**		**24**	**450**	**450**	**900**	**20**

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Visvesvaraya Technological University, Belagavi

Scheme of Teaching and Examinations 2021

Outcome-Based Education(OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2021 – 22)

I Semester (Chemistry Group) **[Common to all B.E./B.Tech. Programmes]**

Sl. No	Course and Course Code		Course Title	Teaching Department (TD)and Paper Setting Board(PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
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		OR											
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				TOTAL	**13**	**09**	**07**		**24**	**450**	**450**	**900**	**20**

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Visvesvaraya Technological University, Belagavi

Scheme of Teaching and Examinations 2021

Outcome-Based Education(OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2021 – 22)

II Semester (For students who attended 1st semester under Chemistry Group) **[Common to all B.E./B.Tech Programs]**

Sl. No	Course and Course Code		Course Title	Teaching Department(TD) and Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
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7	ESC	21ELEL27	Basic Electrical Engineering Laboratory	TD and PSB: E and E Engineering	--	--	2		03	50	50	100	1
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9	AEC	21SFH19/29	Scientific Foundations of Health	Any Department	1	--	--		01	50	50	100	1
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I Semester

CALCULUS AND DIFFERENTIAL EQUATIONS			
Course Code	**21MAT11**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	2:2:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives: The goal of the course Calculus and Differential Equations - 21MAT11 is

- To facilitate the students with a concrete foundation of differential calculus
- To solve the first and higher-order ordinary differential equations enabling them to acquire the knowledge of these mathematical tools.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

Teaching-Learning Process (General Instructions):

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students for group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
   - As an introduction to new topics (pre-lecture activity).
   - As a revision of topics (post-lecture activity).
   - As additional examples (post-lecture activity).
   - As an additional material of challenging topics (pre-and post-lecture activity).
   - As a model solution of some exercises (post-lecture activity).

Module-1: Differential Calculus - 1

Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.

Self-study: Center and circle of curvature, evolutes and involutes.

(RBT Levels: L1, L2 and L3)

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

Module-2: Differential Calculus - 2

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms-L'Hospital's rule. Partial differentiation, total derivative-differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

Self-study: Euler's Theorem and problems. Method of Lagrange undetermined multipliers with single constraint.

(RBT Levels: L1, L2 and L3)

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

Module-3: Ordinary Differential Equations (ODE's) of first order	
Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Applications of ODE's-Orthogonal trajectories, Newton's law of cooling. **Nonlinear differential equations:** Introduction to general and singular solutions; Solvable for p only; Clairaut's equations, reducible to Clairaut's equations. Problems. **Self-Study:** Applications of ODE's: L-R circuits. Solvable for x and y. **(RBT Levels: L1, L2 and L3)**	
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation
Module-4: Ordinary Differential Equations of higher order	
Higher-order linear ODE's with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre homogeneous differential equations. Problems. **Self-Study:** Applications to oscillations of a spring and L-C-R circuits. **(RBT Levels: L1, L2 and L3)**	
Teaching Learning Process	Chalk and talk method / Power Point Presentation
Module-5: Linear Algebra	
Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations; Gauss-elimination method, Gauss-Jordan method and Approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors-Rayleigh's power method to find the dominant Eigenvalue and Eigenvector. **Self-Study**: Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem**.** **(RBT Levels: L1, L2 and L3).**	
Teaching Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics.

- Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
- Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian.
- Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods.
- Demonstrate various models through higher order differential equations and solve such linear ordinary differential equations.
- Test the consistency of a system of linear equations and to solve them by direct and iterative methods.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

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

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books

1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

Reference Books

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed.
2. **Srimanta Pal & Subodh C.** Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Reprint, 2016.

3. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, Latest edition.
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co.Newyork, Latest ed.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. **H.K.Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication (2014).
7. **James Stewart: "**Calculus" Cengage publications, 7th edition, 4th Reprint 2019.

Web links and Video Lectures (e-Resources):

- http://.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/
- VTU e-Shikshana Program
- VTU EDUSAT Program

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

- Quizzes
- Assignments
- Seminars

I/II Semester

Engineering Physics			
Course Code	**21PHY12/22**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03 Hours

Course objectives: This course(21PHY12/22) will enable the students to

- Learn the basic concepts of Physics which are essential in understanding and solving Engineering related challenges.
- Gain the knowledge of problem solving and its practical applications.
- Signify the application of sensitive instrumentation for Nano-scale system.

Teaching-Learning Process (General Instructions)

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

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied and practical skills in physics.
2. State the necessity of physics in engineering studies and offer real life examples.
3. Seminars and Quizzes may be arranged for students in respective subjects to develop skills.
4. Encourage the students for group learning to improve their creativity and analytical skills.
5. While teaching show how every concepts can be applied to the real world. This helps the students to expand understanding level.
6. Support and guide the students for self-study.
7. Ask some higher order thinking questions in the class, which promotes critical thinking.
8. Inspire the students towards the studies by giving new ideas and examples.

Module-1

Oscillations and Waves: **08 Hours**

Free Oscillations: Basics of SHM, derivation of differential equation for SHM, Mechanical simple harmonic oscillators (spring constant by series and parallel combination), Equation of motion for free oscillations, Natural frequency of oscillations.

Damped Oscillations: Theory of damped oscillations (derivation), over damping, critical & under damping (only graphical representation), quality factor.

ForcedOscillations: Theory of forced oscillations (derivation) and resonance, sharpness of resonance.

Shock waves: Mach number, Properties of Shock waves, Construction and working of Reddy shock tube, applications of shock waves, Numerical problems.

Teaching-Learning Process	Chalk and talk, Power point presentation, Videos **Practical Topics**: 1.Spring in series and parallel combination **Self-study Component:** Basics of SHM

Module-2

Modern Physics & Quantum Mechanics: **08 Hours**

Introduction to blackbody radiation spectrum- Wien's law, Rayleigh Jean's law, Stefan -Boltzmann law and Planck's law (qualitative), Deduction of Wien's law and Rayleigh Jeans law from Planck's law. Wave-Particle dualism, de-Broglie hypothesis, de-Broglie wavelength. Heisenberg's uncertainty principle and its physical significance, Application of uncertainty principle-Non-existence of electron in the nucleus (relativistic case), Wave function-Properties, Physical significance, Probability density, Normalization, Eigen values and Eigen functions. Time independent Schrödinger wave equation. Particle in a box- Energy Eigen values and probability densities, Numerical problems.

Teaching-Learning Process	Chalk and talk, Power point presentation, Videos **Practical Topics:** 1.Verification of Stefan's Law **Self-study Component:** Wave- Particle dualism, de-Broglie hypothesis , de- Broglie wavelength.

Module-3

Lasers & Optical Fibers: **08 Hours**

Lasers: Interaction of radiation with matter, Einstein's coefficients (derivation of expression for energy density). Requisites of a Laser system. Conditions for Laser action. Principle, Construction and working of CO_2 and semiconductor Lasers. Application of Lasers in Defence (Laser range finder) and medical applications- Eye surgery and skin treatment.

Optical Fibers: Propagation mechanism, angle of acceptance, Numerical aperture, Modes of propagation, Types of optical fibers, Attenuation and Mention of expression for attenuation coefficient. Discussion of block diagram of point to point communication, Optical fiber sensors- Intensity based displacement sensor and Temperature sensor based on phase modulation, Merits and demerits, Numerical problems.

Teaching-Learning Process	Chalk and talk, Power point presentation, Videos **Practical Topics:** 1. wavelength of LASER source 2. Optical fiber **Self-study Component:** Properties of Laser and comparison with ordinary source

Module-4

Electrical Conductivity in Solids: **08 Hours**

Classical free electron theory: Drude- Lorentz theory & Assumptions, Expression for electrical conductivity (no derivation), Failures of classical free-electron theory.

Quantum free electron theory: Assumptions, Density of states (no derivation), Fermi-energy, Fermi factor & its temperature dependence, Fermi - Dirac Statistics, Expression for electrical conductivity (derivation), Merits of Quantum free electron theory.

Physics of Semiconductors: Fermi level in intrinsic semiconductors, Expression for concentration of electrons in conduction band, Holes concentration in valance band (only mention the expression), Conductivity of semiconductors (derivation), Hall effect, Expression for Hall coefficient (derivation).

Dielectrics: Electric dipole, Dipole moment, Polarization of dielectric materials, Types of polarizations. Qualitative treatment of Internal field in solids for one dimensional infinite array of dipoles (Lorentz field). Claussius-Mossotti equation (derivation), Numerical problems.

Teaching-Learning Process	Chalk and talk, Power point presentation, Videos **Practical Topics:** 1.Fermi Energy of a material 2. Resistivity of a material **Self-study Component:** Electric dipole, Dipole moment, Polarization of dielectric materials

Module-5

Material Characterization Techniques and Instrumentation: **08 Hours**

Introduction to materials: Nanomaterials and nanocomposites. Principle, construction and working of X-ray Diffractometer, crystal size determination by Scherrer equation. Principle, construction, working and applications of -Atomic Force Microscope (AFM), X-ray Photoelectron *S*pectroscope (XPS), Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) Numerical problems.

Teaching-Learning Process	Chalk and talk, Power point presentation, Videos **Self study Component:**X-ray diffractometer.

Course outcome (Course Skill Set)

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

1. Interpret the types of mechanical vibrations and their applications, the role of Shock waves in various fields.
2. Demonstrate the quantisation of energy for microscopic system.
3. App[y LASER and Optical fibers in opto electronic system.
4. Illustrate merits of quantum free electron theory and applications of Hall effect.
5. Analyse the importance of XRD and Electron Microscopy in Nano material characterization.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

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

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books:

1. A Text book of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
2. An Introduction to Lasers theory and applications by M.N.Avadhanulu and P.S.Hemne revised Edition 2012 . S. Chand and company Ltd -New Delhi.
3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4. Concepts of Modern Physics-Arthur Beiser: 6th Ed;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.
5. X-ray diffraction- B E Warren published by Courier Corporation.
6. Nano Composite Materials-Synthesis, Properties and Applications, J. Parameswaranpillai,, N.Hameed, T.Kurian, Y. Yu, CRC Press.
7. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.

Reference Books:

1. Introduction to Mechanics — M.K. Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009.
2. Lasers and Non Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
3. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
4. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.
5. Shock waves made simple- Chintoo S Kumar, K Takayama and KPJ Reddy: Willey India Pvt. Ltd. New Delhi2014.
6. Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, First Edition, 2008.
7. Characterization of Materials- Mitra P.K . Prentice Hall India Learning Private Limited.
8. Nanoscience and Nanotechnology: Fundamentals to Frontiers – M.S.Ramachandra Rao & Shubra Singh, Wiley India Pvt Ltd .

Web links and Video Lectures (e-Resources):

https://www.britannica.com/technology/laser,k
https://nptel.ac.in/courses/115/102/115102124/
https://nptel.ac.in/courses/115/104/115104096/
http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
https://onlinecourses.nptel.ac.in/noc20_mm14/preview

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

http://nptel.ac.in
https://swayam.gov.in
https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

I/II Semester			
BASIC ELECTRICAL ENGINEERING			
Course Code	21ELE13/21ELE23	CIE Marks	50
Teaching Hours/Week (L: T:P)	(2:2:0)	SEE Marks	50
Credits	03	Exam Hours	03

Course objectives:

1) To explain the laws used in the analysis of DC and AC circuits.
2) To explain the behavior of circuit elements in single-phase circuits.
3) To explain the generation of three-phase power and operation of three-phase circuits.
4) To explain the construction and operation of transformers, DC generators and motors, inductionmotors, and synchronous generators.
5) To explain electric transmission and distribution, electricity billing and, equipment, and personalsafety measures.

Module - 1

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits excited by independent voltage sources. Power and energy, maximum power transfer theorem appliedto the series circuit and its applications.

Single-phase circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form, and peak factors. Voltage and current relationship, with phasor diagrams, in R, L, and C circuits.

Teaching-Learning Process	Chalk and talk method.

Module - 2

Single-phase circuits (continued): Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real power, reactive power, apparent power, and Power factor. Measurement of power.

Three-phase circuits: Generation of three-phase power, representation of balanced star (3 wire and 4 wire system) and delta connected loads, the relation between phase and line values of voltage and current from phasor diagrams, advantages of three-phase systems. Measurement of three-phase powerby two-wattmeter method.

Teaching-Learning Process	Single-phase circuits: Chalk and talk, Three-phase circuits: (i) For a generation of 3-phase power, video/animation areused. Numerical problems can be solved with the chalk and talk method. (ii) Practical Topics: Relation between the line and phase parameter in 3-phase connection both delta and Star connections, Power measurement in the 3-phase circuit.

Module - 3

DC Machines: (a) Principle of operation, constructional details, induced emf expression, types of generators, and the relation between induced emf and terminal voltage.

(b) Principle of operation, back emf and torque equations, types of motors, characteristics (shunt andseries only), and applications.

Transformers: Necessity of transformer, the principle of operation, Types, and construction of single-phase transformers, emf equation, losses, variation of losses with respect to load, efficiency, and condition for maximum efficiency.

Teaching-Learning Process	DC Machines: Cut out demo/actual machine module, video for working of machine, chalk, and talk. Transformer topic: Demo modules, actual machine cut-out module and chalk and talk method of teaching, YouTube videos.

Module – 4	
Three-phase induction Motors: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor, slip and problems on the slip, significance of slip, applications. **Three-phase synchronous generators:** Principle of operation, constructional details of salient and non-salient pole generators, synchronous speed, frequency of generated voltage, emf equation, with the concept of winding factor (excluding the derivation and calculation of winding factors).	
Teaching-Learning Process	Machine cut-out demo/actual models, YouTube videos, chalk, and talk.Practical Topic: Demonstration of working of Induction motor.
Module - 5	
Power transmission and distribution: Concept of power transmission and power distribution. Lowvoltage distribution system (400 V and 230 V) for domestic, commercial, and small-scale industry through block diagrams only. **Electricity bill:** Power rating of household appliances including air conditioners, PCs, laptops, printers,etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. **Equipment Safety measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. **Personal safety measures:** Electric Shock, Earthing and its types, Safety Precautions to avoid shock,and Residual Current Circuit Breaker (RCCB).	
Teaching-Learning Process	Chalk and talk, Demonstration of functioning of MCG and Fuse. Visit: Visit nearest area substation/locality pole or pad-mounted transformer.Self-study topic: Safety precautions to avoid shock.
Course outcomes: At the end of the course, the student will be able to 1) **CO1:** Analyse basic DC and AC electric circuits. 2) **CO2:** Explain the working principles of transformers and electrical machines. 3) **CO3:** Explain the concepts of electric power transmission and distribution of power. 4) **CO4:** Understand the wiring methods, electricity billing, and working principles of circuit protectivedevices and personal safety measures.	
Assessment Details (both CIE and SEE) The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together **Continuous Internal Evaluation:** Three Unit Tests each of **20 Marks (duration 01 hour**) 1. First test at the end of 5th week of the semester 2. Second test at the end of the 10th week of the semester 3. Third test at the end of the 15th week of the semester Two assignments each of **10 Marks** 4. First assignment at the end of 4th week of the semester 5. Second assignment at the end of 9th week of the semester Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for	

20 Marks (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

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

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Sl No	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electrical and Electronic Technology	Edward Hughes	Pearson	12th edition, 2016
2	Basic Electrical Engineering	D. C. Kulshreshtha	McGraw-Hill Education	1st edition, 2019
3	A Textbook of Electrical Technology	B.L.Theraja	S Chand and Company	Reprint Edition2014
Reference Books				
1	Basic Electrical Engineering	P.V. Prasad et al.	Cengage	2019
2	Basic Electrical Engineering	D.P. Kothari et al	McGraw-Hill Education	4th Edition,2019
3	Principles Electrical Engineering and Electronics	V.K Mehata, RohitMehta	S Chand and Company	2nd edition, 2015

I Semester

ELEMENTS OF CIVIL ENGINEERING AND MECHANICS			
Course Code	**21CIV14/24**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3 Hrs.

Course objectives:

- To make students learn the scope of various fields of civil engineering.
- To develop students' ability to analyze the problems involving forces, moments with their applications.
- To develop the student's ability to find out the center of gravity and moment of inertia and their applications.
- To make the students learn about kinematics and kinetics and their applications.

Teaching-Learning Process (General Instructions)

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

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

Module-1

Overview of Civil Engineering Systems:

Introduction to structural engineering, geotechnical engineering, Construction technology, hydraulics, water resources and irrigation engineering transportation engineering, environmental and sanitary engineering, GIS, earthquake engineering. Role of civil engineers in the development of the nation.

Building materials:

Stone, brick, wood, glass, aluminum, cement, aggregates, concrete, steel, RCC, PSC, smart materials.

Teaching-Learning Process	Site visits and report preparation, activity-based learning, PowerPoint presentation, videos.

Module-2

Analysis of force systems: Concept of idealization, force, a system of forces, superposition, transmissibility, Resolution, and composition of forces, Law of Parallelogram of forces, polygonal law, Resultant of concurrent coplanar force system, coplanar non-concurrent force system, a moment of forces, couple, Varignons theorem, resultant of coplanar non-concurrent force system, free body diagram, Lamis theorem, equations of equilibrium, equilibrium of concurrent and non-concurrent coplanar force system **Friction:** Types of friction, laws of friction, limiting friction, coefficient of friction concept of static and dynamic friction, numerical problems on impending motion on horizontal and inclined planes along with connected bodies,	
Teaching-Learning Process	Chalk and talk, videos, PowerPoint Presentation, animations
Module-3	
Centroid: Introduction, methods of determining the centroid, locating the centroid of simple figures from first principle, the centroid of composite and built-up sections. **Moment of inertia:** Introduction, method of determining the second moment of area of plane sections from first principles, parallel axis theorem and perpendicular axis theorem section modulus, the radius of gyration, moment of inertia of composite area and built-up sections, concept of product of inertia (No problem).	
Teaching-Learning Process	Chalk and talk, videos, PowerPoint Presentation,, animations
Module-4	
Support reactions: Types of loads and types of supports, statically determinate and indeterminate beams, support reactions in beams, Numerical problems on support reactions for statically determinate beams (point load, udl, uniformly varying loads and moments) **Analysis of trusses:** Types of trusses, analysis of statically determinate trusses using the method of joints and method of sections.	
Teaching-Learning Process	Chalk and talk, videos, ppt, animations
Module-5	
Kinematics: Displacement, average velocity, instantaneous velocity, speed, acceleration, average acceleration, variable acceleration, acceleration due to gravity, Newton's law of motion, rectilinear motion and numerical problems, curvilinear motion, superelevation, projectile motion, relative motion, numerical problems, motion under gravity, numerical problems **Kinetics:** D 'Alembert's principle and its application in-plane motion and connected bodies including pulleys.	
Teaching-Learning Process	Chalk and talk, videos, ppt, animations

Course outcome (Course Skill Set)

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

- Understand the various fields of civil engineering.
- 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.
- Locate the centroid and compute the moment of inertia of regular and built-up sections.
- Analyze the bodies in motion.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

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

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Books

1. R. C. Hibbbler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
2. Bansal R. K., A Text Book of Engineering Mechanics, Laxmi Publications.
3. Andy Ruina and Rudra Pratap, Introducing to Statics and Dynamics, Oxford University Press.
4. Reddy Vijaykumar K and K Suresh Kumar, Engineering Mechanics.
5. F.P. Beer and E. R. Johnston, Mechanics for Engineers, Statics and Dynamics, McGraw Hill.
6. Irving H. Shames, Engineering Mechanics, Prentice-Hall.

Weblinks 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=ljDIIMvx-eg&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=5
- https://www.youtube.com/watch?v=VQRcChR9IkU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=18
- https://www.youtube.com/watch?v=3YBXteL-qY4
- https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=10
- https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&index=7
- https://www.youtube.com/watch?v=atoP5_DeTPE
- https://www.youtube.com/watch?v=ksmsp9OzAsI
- https://www.youtube.com/watch?v=x1ef048b3CE
- https://www.youtube.com/watch?v=l_Nck-X49qc
- https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force
- https://www.youtube.com/watch?v=RIBeeW1DSZg
- https://www.youtube.com/watch?v=R8wKV0UQtlo
- https://www.youtube.com/watch?v=0RZHHgL8m_A
- https://www.youtube.com/watch?v=Bls5KnQOWkY

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

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

Engineering Visualization

Course Code	**21EVN15/25**	CIE Marks	50
Teaching Hour/Week (L:T:P:S)	2:0:2:0	SEE Marks	50
Total Hours of Teaching - Learning	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning Objectives:

CLO1: To understand the basic principles and conventions of engineering drawing
CLO2: To use drawing as a communication mode
CLO3: To generate pictorial views using CAD software
CLO4: To understand the development of surfaces
CLO5: To visualise 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

Module1

Introduction: ***for CIE only***

Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales.

Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.

Orthographic Projections of Points, Lines and Planes:

Introduction to Orthographic projections, Orthographic projections of points in all the quadrants.

Orthographic projections of lines. (Placed in First quadrant only)

Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon and circular laminae. (Placed in First quadrant only).

Application on projections of Lines & Planes (For CIE only)

Module2

Orthographic Projection of Solids:

Orthographic projection of right regular solids (Solids Resting on HP only);

Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes, &Tetrahedron. Application problems on projection of solids.

Projections of Frustum of cone, pyramid & truncated sphere (For CIE only).

Module3
Isometric Projections: Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids. **Conversion of simple isometric drawings into orthographic views**. Problems on applications of Isometric projections of simple objects / engineering components. ***Introduction to drawing views using 3D environment (For CIE only).***
Module4
Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with base on HP only. Development of their frustums and truncations. Problems on applications of development of lateral surfaces like, funnels and trays. ***Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (For CIE Only)***
Module5
Multidisciplinary Applications & Practice *(For CIE Only):* **Free hand Sketching;** True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc **Drawing Simple Mechanisms;** Bicycles, Tricycles, Gear trains, Ratchets, two wheeler cart & Four wheeler carts to dimensions etc **Electric Wiring and lighting diagrams;** Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software **Basic Building Drawing;** Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software, **Electronics Engineering Drawings**- Like, Simple Electronics Circuit Drawings. **Graphs & Charts**: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.
Course outcomes At the end of the course the student will be able to: **CO 1.** Understand and visualize the objects with definite shape and dimensions **CO 2.** Analyze the shape and size of objects through different views **CO 3.** Develop the lateral surfaces of the object **CO 4.** Create a 3D view using CAD software. **CO 5.** Identify the interdisciplinary engineering components or systems through its graphical representation.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation (CIE)

- CIE shall be evaluated for max marks 100. Marks obtained shall be accounted for CIE final marks, reducing it by 50%.
- CIE component should comprise of
- Continuous evaluation of Drawing work of students as and when the Modules are covered on the basis of below detailed weightage.
- At least one closed book **Test** covering all the modules on the basis of below detailed weightage.
- Weightage for Test and Continuous evaluation shall be suitably decided by respective course coordinators.

Module	**Max. Marks Weightage**	**Evaluation Weightage in marks**	
		Computer display and print out (a)	**Preparatory sketching (b)**
Module 1	15	10	05
Module 2	20	15	05
Module 3	20	20	00
Module 4	20	20	00
Module 5	25	15	10
Total	**100**	**80**	**20**
Consideration of CIE Marks		**Total of (a) + (b) ÷ 2 = Final CIE marks**	

Semester End Examination (SEE)

- SEE shall be conducted and evaluated for maximum marks 100. Marks obtained shall be accounted for SEE final marks, reducing it by 50%
- Question paper shall be set jointly by both Internal and External Examiner and made available for each batch as per schedule. ***Questions are to be set preferably from Text Books***.
- Evaluation shall be carried jointly by both the examiners.
- Scheme of Evaluation: *To be defined by the examiners jointly and the same shall be submitted to the university along with question paper*.
- One full question shall be set from each of the Module from Modules 1,2,3,4 as per the below tabled weightage details. ***However, the student may be awarded full marks, if he/she completes solution on computer display without sketch.***

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	**Preparatory sketching (b)**
Module 1	20	15	05
Module 2	30	25	05
Module 3	25	20	05
Module 4	25	20	05
Total	**100**	**80**	**20**
Consideration of SEE Marks		**Total of (a) + (b) ÷ 2 = Final SEE marks**	

Suggested Learning Resources:

Text Books

- *Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry*, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.
- *K. R. Gopalakrishna, & Sudhir Gopalakrishna*: Textbook Of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
- *S. N. Lal:* Engineering Drawing with an Introduction to AutoCAD : First-angle Projection 1st Edition, Cengage, Publication, 2018
- *S.N. Lal, & T Madhusudhan*:, Engineering Visulisation, 1st Edition, Cengage, Publication
- *Luzadder Warren J., Duff John M*., Fundamentals of Engineering Drawing: with an Introduction to Interactive Computer Graphics for Design and Production, Prentice-Hall of India Pvt. Ltd., New Delhi, Eastern Economy Edition, 2005.

Reference Books

- *Parthasarathy N. S., Vela Murali*, Engineering Drawing, Oxford University Press, 2015.
- *Dhawan R. K.*, A Textbook of Engineering *Drawing, 3/e*, S. Chand Publishing, 2019.
- *Venugopal K.*, Engineering Drawing and Graphics, New Age International publishers, 2014.
- *Bhattacharya S. K.*, Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint 2005.
- *Chris Schroder*, Printed Circuit Board Design using AutoCAD, Newnes, 1997.
- *K S Sai Ram* Design of steel structures, , Third Edition by Pearson
- *Nainan p kurian* Design of foundation systems, Narosa publications
- *A S Pabla*, Electrical power distribution, 6th edition, Tata Mcgraw hill

I/II Semester

ENGINEERING PHYSICS LABORATORY			
Course Code	21PHYL16/26	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	3 Hours

Course objectives:

1. Understand the measurement techniques and usage of instruments in physics.
2. Demonstrate competency and understanding of the basic concepts found in experimental Physics.
3. Construct andanalyse the electronic circuits.
4. Estimate the error in measurements and the ability to prepare a valid laboratory record.

List of Experiments: Any Ten Experiments to be performed

Sl.NO	Experiments
1	Determination of spring constants by Series and Parallel combination.
2	Determination of rigidity modulus of the material by the torsional pendulum.
3	Study series and parallel LCR resonance and hence calculate inductance, bandwidth, and quality factor.
4	To verify Stefan's Law
5	I-V Characteristics of Photodiode.
6	Determine acceptance angle and numerical aperture of an optical fiber.
7	Determine the wavelength of the laser source using a diffraction grating elements.
8	Determine the Fermi energy of metal (copper).
9	To find the resistivity of a semiconductor using the Four Probe method.
10	To determine the dielectric constant by charging and discharging the capacitor.
11	Determination of Magnetic field intensity along the axis of a circular coil carrying current.
12	Forced mechanical oscillations and resonance.

Course outcomes (Course Skill Set):

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

1. Understand the measuring techniques
2. Operate different instruments and be capable to analyse the experimental results.
3. Construct the circuits and theiranalysis.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks (25 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning

Semester End Evaluation (SEE Students):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the internal and external examiners appointed by the University

1. All laboratory experiments are to be included for practical examination.
2. (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by internal and external examiners.
3. Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
4. Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by Internal and external examiners.
5. General rubrics for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated

for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

6. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

7. Rubrics suggested in **Annexure-II of Regulation book**

Suggested Learning Resources:

Reference books.

1. Engineering Lab Manual by WBUT-New Age International Publishers.
2. Applied Physics Lab Manual by Anoop Sing Yadav.

Weblinks, Video lectures, and e-resources.

https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1
https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1
https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1
https://bop-iitk.vlabs.ac.in/basics-of-physics/List%20of%20experiments.html
https://virtuallabs.merlot.org/vl_physics.html
https://phet.colorado.edu
https://www.myphysicslab.com

BASICELECTRICALENGINEERINGLABORATORY			
CourseCode	21ELE17/27	CIEMarks	50
TeachingHours/Week(L:T:P)	0:0:2	SEE Marks	50
Credits	01	ExamHours	03

Courseobjectives:

Afterstudyingthis course,studentsshould beableto

1) explainhowto verifyKCL andKVLforDCcircuitandmaximumpower transfertheorem.
2) explainpowerandpowerfactormeasurementofdifferenttypesoflamps.
3) explainthe measurementofimpedanceforR-Lcircuits.
4) explainthe measurement of powerconsumed ina3-phaseload.
5) explainmethodsofcontrollingalampfromdifferent places.
6) explaintheeffectof openandshortcircuits insimplecircuitsand the suitabilityofearthresistance.

Sl. NO	Experiments
1	VerificationofKCL andKVL forDCcircuits
2	Verificationofmaximumpowertheorem.
3	MeasurementofCurrent,Power,andPowerFactorofIncandescentLamp,FluorescentLamp and LEDLamp.
4	MeasurementofResistanceandInductanceofaChokecoil usingthreevoltmetermethod.
5	DeterminationofPhaseandLinequantitiesinthree-phasestaranddeltaconnectedloads.
6	Measurement of3 -phasePower usingTwoWattmeter Method.
7	Determinationofefficiencyofasingle-phasetransformerbydirectloadtest.
8	TwoWayandThree-WayControlof Lamp and Formation ofTruthTable.
9	MeasurementofEarthResistance
10	Studyof the effect of OpenandShortcircuitsinsimple circuits.

Courseoutcomes

At theendofthecoursethestudent will beableto:

CO1:verifyKCLandKVLandmaximumpower transfertheoremforDCcircuits.

CO2:comparepowerfactorsofdifferenttypesoflamps.

CO3:demonstratethemeasurementofthe impedanceofanelectricalcircuitandpowerconsumedbya3-phase load.

CO4:analyzetwo-wayand three-waycontroloflamps.

CO5:explaintheeffectsofopenandshortcircuitsinsimplecircuits.

CO6:interpretthe suitabilityofearthresistance measured.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE). A student has to secure overall 40% of the maximum marks of the course (CIE+SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-

up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.

- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in **Annexure-II of Regulation book**
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the internal and external examiners appointed by the University

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by internal and external examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by Internal and external examiners.

General rubrics for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

Rubrics suggested in **Annexure-II of Regulation book**

Communicative English

I Semester - BE

Communicative English			
Course Code	**21EGH18**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:0:0 Hours	SEE Marks	50
Total Hours of Pedagogy	02 Hours/Week	Total Marks	100
Credits	02	Exam Hours	02 hours

Course objectives:

The course (21EGH18) will enable the students,

- To know about Fundamentals of Communicative English and Communication Skills in general.
- To train to identifythenuancesof phonetics, intonation and enhance pronunciation skills for better communication skills.
- To impart basic English grammar and essentials ofimportant language skills.
- To enhance English vocabulary and language proficiency for better communication skills.
- To learn about Techniques of Information Transfer through presentation.

Language Lab : To augment LSRW, grammar, and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE /VTU guidelines.

Teaching-Learning Process (General Instructions)

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

1. Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.
   (i) Direct instructional method (Low /Old Technology),
   (ii) Flipped classrooms (High/advanced Technological tools),
   (iii) Blended learning (combination of both),
   (iv) Enquiry and evaluation based learning,
   (v) Personalized learning,
   (vi) Problems based learning through discussion,
   (vii) Following the method of expeditionary learning Tools and techniques,
   (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills.
2. Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.

Module-1

Introduction to Communicative English:

Introduction, Language as a Tool, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English (Communication Channels). Interpersonal and Intrapersonal Communication Skills, How to improve and Develop Interpersonal and Intrapersonal Communication Skills.

Teaching-Learning Process	Chalk and talk method, Videos, PowerPoint presentation to teach Communication skills (LSRW Skills), Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Module-2

Communicative English

Introduction to Phonetics :

Introduction, Phonetic Transcription, English Pronunciation, Pronunciation Guidelines Related to consonants and vowels, Sounds Mispronounced, Silent and Non-silentLetters, Syllables and Structure, Word Accent and Stress Shift, – Rules for Word Accent, Intonation – purposes of intonation, Spelling Rules and Words often Misspelt – Exercises on it.Common Errors in Pronunciation.

Teaching-Learning Process	Chalk and talk method, Videos, PowerPoint presentation and Animation videos to teach phonetics in Practical method, creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Module-3

Basic English Communicative Grammar and Vocabulary PART - I :

Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Conjunctions, Articles and Preposition. Preposition, kinds of Preposition and Prepositions often Confused. Articles: Use of Articles – Indefinite and Definite Articles, Pronunciation of '*The*', words ending *'age'*, some plural forms. Introduction to Vocabulary, All Types of Vocabulary –Exercises on it.

Teaching-Learning Process	Chalk and talk method, Videos, PowerPoint presentation to teach Grammar, Animation videos on communication and language skills, creating real-time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Module-4

Basic English Communicative Grammar and Vocabulary PART - II:

Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exceptions in Question Tags and Exercises, One Word Substitutes and Exercises. Strong and Weak forms of words, Words formation - Prefixes and Suffixes (Vocabulary), Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.

Teaching-Learning Process	Chalk and talk method, PowerPoint presentation to teach Grammar and phonetics, Animation videos on communication and language skills, creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Module-5

Communication Skills for Employment:

Information Transfer: Oral Presentation - Examples and Practice. Extempore / Public Speaking, Difference between Extempore / Public Speaking, Communication Guidelines for Practice.Mother Tongue Influence (MTI) – South Indian Speakers, Various Techniques for Neutralization of Mother Tongue Influence – Exercises.Reading and Listening Comprehensions – Exercises.

Teaching-Learning Process	Chalk and talk method, Videos, PowerPoint presentation to teach Grammar and phonetics, Animation videos on communication and language skills, creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Course outcome (Course Skill Set)

At the end of the course(21EGH18) the student will be able to :

1. Understand and apply the Fundamentals of Communication Skills in their communication skills.
2. Identify the nuances of phonetics, intonation and enhance pronunciation skills.
3. To impart basic English grammar and essentials of language skills as per present requirement.
4. Understand and useall types of English vocabulary and language proficiency.
5. AdopttheTechniques of Information Transfer through presentation.

Communicative English

Assessment Details (both CIE and SEE)

(methods of CIE need to be defined topic wise i.e.- MCQ, Quizzes, written test, Reports writing, Seminar and activities). Continuous internal evaluation (CIE) needs to be conducted for 50 marks like Engineering courses. The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% of maximum marks in CIE and 35% of maximum marks in SEE to pass. MCQ. Overall a student has to secure 40% of the maximum marks of course (CIE+SEE). The pattern (Multiple Choice Questions) Semester End Exam (SEE) is conducted for 50 marks (120 minutes duration). Based on this grading will be awarded.

Continuous Internal Evaluation (CIE) :

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

All the tests are preferred similar to SEE pattern; however, teacher may follow test pattern similar to other theory courses of Engineering

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Report writing /Group discussion/Seminar any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

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

Semester End Examination (SEE) :

SEE paper will be set for 100 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is 120 minutes**.** Marks scored are scaled down to 50 Marks. *(Time duration may be made 90 minutes to train the students for engineering / non-engineering competitive examination)*

1. Communicative English has become a very important component in all engineering and non-engineering competitive examinations. In exams like GRE, TOEFL, IELTS and GATE exam, all state and Central Government recruitment examinations, placement tests and other Examinations, so the pattern of question paper, in general, will be in a multiple-choice question (MCQ) Pattern. So, to meet the relevance of the recruitment requirement of our Engineering students "Communicative English" Semester end examination (SEE) will be conducted in a multiple choice question (MCQ) pattern.
2. MCQ Pattern (Multiple Choice Questions) Semester End Exam (SEE) is conducted for 50 marks (120 minutes duration).

Communicative English

Suggested Learning Resources:

1) **Communication Skills** by Sanjay Kumar and Pushp Lata, Oxford University Press - 2019.
2) **English for Engineers** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
3) **A Textbook of English Language Communication Skills,** Infinite Learning Solutions–(Revised Edition) 2021.
4) **A Course in Technical English–D Praveen Sam, KN Shoba,** Cambridge University Press – 2020.
5) **Technical Communication** by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
6) **English Language Communication Skills – Lab Manual cum Workbook,** Cengage learning India Pvt Limited [Latest Revised Edition] – 2019.
7) **Practical English Usage** by Michael Swan, Oxford University Press – 2016.
8) **Technical Communication** – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.

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

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions
- ✓ Seminars and assignments

I Semester

INNOVATION and DESIGN THINKING			
Course Code	**21IDT19/29**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	25	Total Marks	100
Credits	01	Exam Hours	01

Course Category: Foundation

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

Course objectives:

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

Teaching-Learning Process (General Instructions)

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

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

Module-1

PROCESS OF DESIGN

Understanding Design thinking

Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping

Teaching-Learning Process	Introduction about the design thinking: Chalk and Talk method Theory and practice through presentation MVP and Prototyping through live examples and videos

Module-2

Tools for Design Thinking

Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design

Teaching-Learning	Case studies on design thinking for real-time interaction and analysis

Process	Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking

Module-3

Design Thinking in IT

Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping

Teaching-Learning Process	Case studies on design thinking and business acceptance of the design Simulation on the role of virtual eco-system for collaborated prototyping

Module-4

DT For strategic innovations

Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.

Teaching-Learning Process	Business model examples of successful designs Presentation by the students on the success of design Live project on design thinking in a group of 4 students

Module-5

Design thinking workshop

Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test

Teaching-Learning Process	8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop

Course Outcomes:

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

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Appreciate various design process procedure	K2
CO2	Generate and develop design ideas through different technique	K2
CO3	Identify the significance of reverse Engineering toUnderstand products	K2
CO4	Draw technical drawing for design ideas	K3

Assessment Details (both CIE and SEE)

methods of CIE need to be defined topic wise i.e.- Tests, MCQ, Quizzes, Seminar or micro project/Course Project, Term Paper)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 35% of maximum marks in SEE and a minimum of 40% of maximum marks in CIE. Semester End Exam (SEE) is conducted for 50 marks (1 hours' duration) based on this grading will be awarded.

The student has to score a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

(Preferred pattern of the all test are similar to the SEE pattern, however; teacher may follow the CIE test pattern of other engineering courses)

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Report writing /Group discussion/Seminar any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

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

Semester End Examination:

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

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is **01 hours**

Suggested Learning Resources:

Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design",Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

References:

5. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", CengageLearning, Second Edition, 2011.
6. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Web links and Video Lectures (e-Resources):

1. www.tutor2u.net/business/presentations/. /**productlifecycle**/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Developmen
4. https://www.mindtools.com/brainstm.html
5. https://www.quicksprout.com/. /how-to-**reverse-engineer**-your-competit
6. www.vertabelo.com/blog/documentation/**reverse-engineering**
   https://support.microsoft.com/en-us/kb/273814
7. https://support.google.com/docs/answer/179740?hl=en
8. https://www.youtube.com/watch?v=2mjSDIBaUlM
   thevirtualinstructor.com/foreshortening.html
   https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf
   https://dschool.stanford.edu/use-our-methods/ 6. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process 7. http://www.creativityatwork.com/design-thinking-strategy-for-innovation/ 49 8. https://www.nngroup.com/articles/design-thinking/ 9. https://designthinkingforeducators.com/design-thinking/ 10. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf

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

- http://dschool.stanford.edu/dgift/

https://onlinecourses.nptel.ac.in/noc19_mg60/preview

II Semester – AEC Course

Scientific Foundations of Health

Course Code	**21SFH19/29**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	02 Hours/Week	Total Marks	100
Credits	01	Exam Hours	60 Minutes / 01 Hour

Course objectives:

The course 21**SFH29** will enable the students:

- To know about Health and wellness (and its Beliefs)
- To acquire Good Health & It's balance for positive mind-set
- To Build the healthy lifestyles for good health for their better future
- To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world
- To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
- To Prevent and fight against harmful diseases for good health through positive mindset

Teaching-Learning Process (General Instructions)

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

- ✓ Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.
  (i) Direct instructional method (Low /Old Technology),
  (ii) Flipped classrooms (High/advanced Technological tools),
  (iii) Blended learning (combination of both),
  (iv) Enquiry and evaluation based learning,
  (v) Personalized learning,
  (vi) Problems based learning through discussion,
  (vii) Following the method of expeditionary learning Tools and techniques,
- ✓ Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of the concepts of Health and Wellness in general.

Module-1

Good Health and It's balance for positive mindset:

What is Health, Why Health is very important Now? – What influences your Health?, Health and Behaviour, Health beliefs and advertisements, Advantages of good health (Short term and long term benefits), Health and Society, Health and family, Health and Personality - Profession. 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), how to maintain good health, Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.

Teaching-Learning Process	Chalk and talk method, Power Point presentation and YouTube videos, Animation videos methods. creating real time stations in classroom discussions. Giving activities &assignments.

Module-2

Building of healthy lifestyles for better future:

Developing a healthy diet for good health, Food and health, Nutritional guidelines for good health and well beingness, Obesity and overweight disorders and its management, Eating disorders - proper exercises for its maintenance (Physical activities for health), Fitness components for health, Wellness and physical function,

Teaching-Learning Process	Chalk and talk method, PowerPoint presentation and YouTube videos, Animation videos methods. creating real time stations in classroom discussions. Giving activities &assignments.

Module-3

Creation of Healthy and caring relationships :

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,

Teaching-Learning Process	Chalk and talk method, PowerPoint presentation and Animation videos methods. creating real time stations in classroom discussions. Giving activities and assignments.

Module-4

Avoiding risks and harmful habits :

Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction develops and 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 Such as..., how to recovery from addictions.

Teaching-Learning Process	Chalk and talk method, PowerPoint presentation and Animation videos methods. creating real time stations in classroom discussions. Giving activities and assignments.

Module-5

Preventing and fighting against diseases for good health :

Process of infections and reasons for it, How to protect from different types of transmitted infections such as….,

Current trends of socio economic impact of reducing your risk of disease, How to reduce risks for good health,

Reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life,

Health and Wellness of youth : a challenge for the upcoming future Measuring of health and wealth status.

Teaching-Learning Process	Chalk and talk method, PowerPoint presentation and YouTube videos, Animation videos methods. creating real time stations in classroom discussions. Giving activities & assignments.

Course outcome (Course Skill Set)

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

CO 1: To understand Health and wellness (and its Beliefs)

CO 2: To acquire Good Health & It's balance for positive mindset

CO 3: To inculcate and develop the healthy lifestyle habits for good health.

CO 4: To Create of Healthy and caring relationships to meet the requirements of MNC and LPG world

CO 5: To adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus.

CO 6: To positively fight against harmful diseases for good health through positive mindset.

Assessment Details (both CIE and SEE)

methods of CIE need to be defined topic wise i.e.- Tests, MCQ, Quizzes, Seminar or micro project/Course Project, Term Paper)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 35% of maximum marks in SEE and a minimum of 40% of maximum marks in CIE. Semester End Exam (SEE) is conducted for 50 marks (hours' duration). Based on this grading will be awarded.

The student has to score a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

(All testsare similar to the SEE pattern i.e question paper pattern is MCQ)

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Report writing /Group discussion/Seminar any one of three suitably planned to attain the COs and POs for **20 Marks**(**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

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

Semester End Examination:

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

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is **01 hours**

Suggested Learning Resources:

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 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
3. **HEALTH PSYCHOLOGY (Ninth Edition)** by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press
4. **Scientific Foundations of Health (Health & Welness) - General Books** published for university and colleges references by popular authors and published by the reputed publisher.

1) **SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos** and other materials / notes

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

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students, instruct the students to prepare Flowcharts and Handouts
- ✓ Organizing Group wise discussions and Health issues based activities
- ✓ Quizzes and Discussions
- ✓ Seminars and assignments

II Semester

ADVANCED CALCULUS AND NUMERICAL METHODS			
Course Code	**21MAT21**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	2:2:0:1	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives: The goal of the course Advanced Calculus and Numerical Methods - 21MAT21 is,

- To facilitate the students with a concrete foundation of integral calculus.
- To facilitate the students with concrete foundation of vector calculus, partial differential equations and numerical methods enabling them to acquire the knowledge of these mathematical tools.

Teaching-Learning Process (General Instructions):

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

1. In addition to the traditional lecture method, different type of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples
3. Support and guide the students for self-study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress
5. Encourage the students for group learning to improve their creative and analytical skills
6. Show short related video lectures in following ways:

- As an introduction to new topics (pre-lecture activity).
- As a revision of topics (post-lecture activity).
- As additional examples (post-lecture activity).
- As an additional material of challenging topics (pre and post lecture activity).
- As a model solution of some exercises (post-lecture activity)

Module-1: Integral Calculus

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area and Volume by double integral. Problems.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.

Self-Study: Center of gravity.

(RBT Levels: L1, L2 and L3)

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

Module-2: Vector Calculus

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

Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem and Stoke's theorem. Problems.

Self-Study: Volume integral and Gauss divergence theorem**.**

(RBT Levels: L1, L2 and L3)

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

Module-3: Partial Differential Equations (PDE's)	
Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation. **Self-Study**: Solution of one-dimensional heat equation and wave equation by the method of separation of variables. **(RBT Levels: L1, L2 and L3)**	
Teaching-Learning Process	Chalk and talk method / Power Point Presentation
Module-4: Numerical methods -1	
Solution of polynomial and transcendental equations: Regula-Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems. N**umerical integration**: Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules(without proof). Problems. S**elf-Study**: Bisection method, Lagrange's inverse Interpolation, Weddle's rule. **(RBT Levels: L1, L2 and L3)**	
Teaching-Learning Process	Chalk and talk method / Power Point Presentation
Module-5: Numerical methods -2	
Numerical Solution of Ordinary Differential Equations (ODE's): Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's predictor-corrector formula (No derivations of formulae). Problems. **Self-Study:** Adam-Bashforth method. **(RBT Levels: L1, L2 and L3)**	
Teaching-Learning Process	Chalk and talk method/Power Point Presentation

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics:

- Apply the concept of change of order of integration and change of variables to evaluate multiple integrals and their usage in computing the area and volume.
- Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
- Formulate physical problems to partial differential equations and to obtain solution for standard practical PDE's.
- Apply the knowledge of numerical methods in modelling of various physical and engineering phenomena.
- Solve first order ordinary differential equations arising in engineering problems.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

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

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books

1. **B.S. Grewal**: "Higher Engineering Mathematics", Khanna publishers, 44 th Ed.2018
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference Books:

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed.
2. **Srimanta Pal & Subodh C. Bhunia:** "Engineering Mathematics" Oxford University press, 3rd Reprint, 2016.
3. **N.P Bali and Manish Goyal**: "A text book of Engineering Mathematics" Laxmi Publications, Latest edition
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co. Newyork, Latest ed.
5. **Gupta C.**B, **Sing S.R and Mukesh kumar**: "Engineering Mathematics for Semester I and II", Mc-Graw Hill Education(India) Pvt.Ltd. 2015
6. **H.**K.**Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication (2014).
7. **James Stewart: "**Calculus" Cengage publications, 7th edition, 4th Reprint 2019.

Web links and Video Lectures (e-Resources):

- http://.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/
- VTU e-Shikshana Program
- VTU EDUSAT Program

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

- Quizzes
- Assignments
- Seminars

I/II Semester

ENGINEERING CHEMISTRY			
Course Code	**21CHE12/22**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3Hour

Course Objectives: The course will enable the students to

CLO1: Impart the basic knowledge of chemistry and its principles involved in electrochemistry, energy storage devices and its commercial applications.

CLO2: Understand the basic principles of corrosion and its prevention, metal finishing and its technological importance

CLO3: Master the knowledge of synthesis, properties and utilization of engineering materials like polymers & Nano materials.

CLO4: Apply the knowledge of Green Chemistry principles for production of chemical compounds. understanding the concepts of alternative energy sources.

CLO5: Understand the basic concepts of water chemistry & theory, basic principle and applications of volumetric analysis and analytical instruments.

Pedagogy (General Instructions):

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

1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain methods of synthesis of nanomaterials.
4. Encourage collaborative (Group Learning) Learning in the class
5. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
7. Topics will be introduced in a multiple representation.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1

Electrochemistry and energy storage systems:

Electrochemistry: Introduction, EMF of cell, Free Energy, Single electrode potential-Derivation of Nernst equation, Numerical problems based on Nernst Equation (E, E^o & Ecell).

Reference Electrodes: Introduction, construction, working and applications of calomel electrode, ion selective electrodes: Introduction, construction, working and applications of Glass electrode, determination of pH using Glass electrode.

Energy storage Systems: Introduction, Classification of batteries (primary, secondary and reserved batteries). Construction, working and applications of Li-ion batteries. Advantages of Li-ion battery as

an electrochemical energy system for electric vehicles. Recycling of Lithium-ion batteries by direct cycling Method. Brief introduction of Na- ion battery.	
Teaching Learning Process	Electrochemistry and energy systems-chalk and talk method, power point presentation. Practical topic: Determination of pKa value of weak acid using glass electrode. Energy storage Systems-Power point presentation, youTube videos for Li-ion battery construction and working. Self-study material: Construction and working of classical batteries like Zn-MnO_2 and Pb-PbO_2 batteries
Module-2	
Corrosion and Metal finishing: **Corrosion and it's control:** Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion - Differential metal and differential aeration (pitting and water line). Corrosion control: Anodizing – Anodizing of aluminum, Cathodic protection - sacrificial anode and impressed current methods, Metal coatings – Galvanization. Corrosion Penetration Rate (CPR), numerical problems on CPR. **Metal finishing:** Introduction, technological importance. Electroplating: Introduction, Electroplating of chromium (hard and decorative). Electroless plating: Introduction, distinction between electroplating and electroless plating processes. Electroless plating of copper.	
Teaching Learning Process	Chalk and talk method and power point presentation - Electrochemical theory of corrosion, Factors affecting the rate of corrosion, Types of corrosion and corrosion control. Technological importance. Electroplating: Introduction, principle governing electroplating, polarization, decomposition potential and over voltage. Videos: Electroplating of chromium, electroless plating of Nickel and copper Self-learning material: Organic coatings: Paint, components of paints and their functions. Varnish, definition, differences between paints varnishes.
Module-3	
Engineering Materials **Polymers:** Introduction, Synthesis and applications of Polyurethanes. Polymer composites-Introduction, synthesis, properties & applications of Kevlar Fibre, **Conducting Polymers**: Introduction, Synthesis & Mechanism of conduction in polyaniline and factors influencing conductivity of organic polymers. **Biodegradable polymers:** Introduction and their requirements. Synthesis, properties and applications of Poly lactic acid. **Nanomaterials:** Introduction, size dependent properties (Surface area, Electrical, Optical and Catalytic properties). Synthesis of nanomaterials: Top down and bottom-up approaches, Synthesis by Sol-gel, and precipitation method, Nanoscale materials: Fullerenes, Carbon nanotubes and graphenes –brief Explanation, properties and applications.	

Teaching Learning Process	Chalk and talk method & Power point presentation - Polymers, Conducting Polymers, Biodegradable polymers, nanomaterials Practical topics: Synthesis of nanomaterials by precipitation method Self-learning material: Classification of polymers, nanomaterial synthesis by chemical vapor deposition.

Module-4

Green Chemistry and Alternative energy resources

Green Chemistry: Introduction, definition, Major environmental pollutants - Oxides Nitrogen, Sulphur and Carbon (Mansion the impact of these pollutants on environment), Basic principles of green chemistry -brief discussion on 12 principles of green chemistry.

Various green chemical approaches – Microwave synthesis, Bio catalysed reaction (only explanation with examples),

Solvent-free reactions- advantages and conditions

Synthesis of typical organic compounds by conventional and green route;

i) Adipic acid – Conventional synthesis from Benzene, Green synthesis from glucose.

ii) Paracetamol- Conventional and Green synthesis from Phenol

Industrial applications of Green Chemistry

Green fuel: Hydrogen-production (Photo electrocatalytic and photo catalytic water splitting) and applications in hydrogen fuel cells. Construction, working and applications of Methanol-Oxygen fuel cell (H_2SO_4 as electrolyte).

Solar Energy:

Introduction, construction, working and applications of photovoltaic cell.

Teaching Learning process	Chalk and talk/power point presentation - Basic principles of green chemistry Videos: Various green chemical approaches, Self-study material: Atom economy-synthesis of ethylene oxide and methyl methacrylate. Advantages & disadvantages of photovoltaic cell.

Module-5

Water Chemistry, chemical analysis and Instrumental methods of analysis

Water chemistry:

Introduction, sources and impurities in water, Potable water; meaning and specifications (as per WHO standards), Hardness of water, types, determination of hardness using EDTA titration, numerical problems on hardness of water. Definition of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD of waste water sample and Numerical problems on COD.

Methods of Chemical Analysis:

Volumetric Analysis: Introduction, principles of titrimetric analysis, requirement of titrimetric analysis, primary and secondary standards. Requirement of a primary standard solution, units of standard solutions- Definition of normality, molarity, molality, mole fraction, ppm.

Instrumental methods of analysis:

Introduction, Theory, Instrumentation and applications of Colorimetry, Flame Photometry, Potentiometry, Conductometry (Strong acid with strong base, weak acid with a strong base, mixture of strong acid and a weak acid with a strong base)

Teaching	Chalk and talk/power point presentation – principles of titrimetric analysis, requirement of titrimetric analysis, Classification of titrimetric analysis, Ostwald's theory of acid-base

Learning process	indicator taking phenolphthalein and methyl orange as examples. Instrumental methods of analysis. Practical topic: Volumetric titrations, instrumental methods. Self-study material- Types of volumetric titrations (Neutralization, redox and complexometric),

Course outcome (Course Skill Set)

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

CO1: Discuss the electrochemical energy systems such as electrodes and batteries.

CO2: Explain the fundamental concepts of corrosion, its control and surface modification methods namely electroplating and electroless plating

CO3: Enumerate the importance, synthesis and applications of polymers. Understand properties and application of nanomaterials.

CO4: Describe the principles of green chemistry, understand properties and application alternative fuels.

CO5: Illustrate the fundamental principles of water chemistry, applications of volumetric and analytical instrumentation.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

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

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

1. Uppal M.M, Jain and Jain. Engineering Chemistry, Khanna Publishers, 35th Edition, 2013.
2. P.C. Jain and Monica Jain, A test Book of Engineering Chemistry, Dhanpat Rai Publications, New Delhi, 12th Edition, 2012.
3. SS Dara & Dr. SS Umare. -A Text book of Engineering Chemistry, S Chand & Company Ltd., 12th Edition, 2011.
4. R.V. Gadag and Nitthyananda Shetty-A Text Book of Engineering Chemistry, I.K. International Publishing house. 2nd Edition, 2016.

5. B.S. Jai Prakash, R. Venugopal, Sivakumaraiah& Pushpa Iyengar.,- Chemistry for Engineering Students", Subash Publications, Bangalore.5th Edition, 2014
6. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1999.
7. M.G. Fontana, N.D. Greene, Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.
8. Principles of Physical Chemistry , B.R. Puri, L.R. Sharma & M.S. Pathania, S. Nagin Chand & Co., 41 Edition, 2004.
9. G.A. Ozin & A.C. Arsenault, "Nanotechnology A Chemical Approach to Nanomaterials". RSC Publishing, 2005.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM.

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

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

PROBLEM-SOLVING THROUGH PROGRAMMING			
Course Code	**21PSP23/13**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Objectives:

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

Teaching-Learning Process (General Instructions)

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

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

Module-1

Introduction to Computer Hardware and Software: Computer generations, computer types, bits, bytes and words, CPU, Primary memory, Secondary memory, ports and connections, input devices, output devices, Computers in a network, Network hardware, Software basics, software types.

Overview of C: Basic structure of C program, executing a C program. Constant, variable and data types, Operators and expressions

Teaching-Learning Process:	Chalk &board, Active Learning

Module-2

Managing Input and output operations. Conditional Branching and Loops. Example programs, finding roots of a quadratic equation, computation of binomial coefficients, plotting of Pascal's triangle.

Teaching-Learning Process:	Chalk & board, Active Learning, Problem based learning

Module-3

Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching and Sorting **Algorithms** (Linear search, Binary search, Bubble sort and Selection sort).

Teaching-Learning Process:	Chalk & board, MOOC, Active Learning

Module-4	
User Defined Functions and Recursion. Example programs: Finding Factorial of a positive integer, GCD of two numbers and Fibonacci sequence.	
Teaching-Learning Process:	Chalk& board, Problem based learning
Module-5	
Structures, Unions and Pointers, Pre-processor Directives and Example Programs like Addition of two complex numbers using structures , compute the sum, mean and standard deviation of all elements stored in an array of N real numbers using pointers.	
Teaching-Learning Process:	Chalk & board, MOOC

Course Outcomes (Course Skill Set)

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

1. Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
2. Apply programming constructs of C language to solve the real world problem
3. Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting
4. Explore user-defined data structures like structures, unions and pointers in implementing solutions
5. Design and Develop Solutions to problems using modular programming constructs using functions

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

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

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

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.

Reference:

1. Reema Thereja , Programming in C , Cengage publication,

Web links and Video Lectures (e-Resources):

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

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

1. Real world problem solving using group discussion. E.g., Electricity bill generation. etc.,
2. Demonstration of solution to a problem through programming.
3. Demonstration of simple project and motivating the students to develop similar type of projects.

I/II Semester

BASIC ELECTRONICS & COMMUNICATION ENGINEERING			
Course Code	21ELN14/24	CIE Marks	50
Teaching Hours / Week (L: T:P:S)	2:2:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3

Course Objectives:

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

Teaching-Learning Process (General Instructions)

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

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

Module I

Electronic Circuits:

Power Supplies – Block diagram, Rectifiers, Reservoir and smoothing circuits, Full-wave rectifiers, Bi-phase rectifier circuits, Bridge rectifier circuits, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.

Amplifiers – Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, Multi-stage amplifiers.

Operational amplifiers - Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits. **Oscillators** – Positive feedback, Conditions for oscillation, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators. *(Only Concepts, working, and waveforms. No mathematical derivations)* **Text 1: Chapters 6, 7, 8 and 9**	
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos, Animation of input and output waveforms of the op-amp circuits. Practical Topics: Problems on voltage regulators, op-amp parameters, oscillators. Self-study topics: BJT amplifier types, comparison of BJT & FET.
Module II	
Logic Circuits – Logic gates, Bistables, R-S Bistables, D-type Bistables, J-K Bistables. **Text 1: Chapter 10** Data representation, Data types, Data storage, A microcontroller system. **Text 1: Chapter 11** Realization using basic gates and truth table the Half Adder (**Text 4**: Fig.11.11) and Full Adder (**Text 4**: Table 11.5 & Fig. 11.13), Multiplexer (**Text 4**: 10.5.3) and decoder (**Text 4**: 10.5.4). Shift registers, Register type – operation and truth table (**Text 4**: 13.2, 13.3), Counters and asynchronous counters (**Text 4**: 13.5, 13.6) **Text 4: Fig. 11.11, Fig. 11.13, 10.5.3, 10.5.4, 13.2, 13.3, 13.5, 13.6** ***(No simplification of Boolean algebra, no K-maps. Only logic circuit, working and truth table)***	
Teaching-Learning Process	Chalk and talk method, PowerPoint Presentation, YouTube videos, Animation of truth table and timing waveforms of the logic circuits especially flip flops, adders, shift registers, and counters. Practical Topics: Problems on data representation and types. Self-study topics: Waveforms of counters, shift registers.
Module III	
Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC, Harvard vs Von-Neumann. **Text 2:** 1.1, 1.2, 1.4, 1.5, Fig. 2.1, 2.1, 2.1.1.4, 2.1.1.6, 2.1.1.7. **Sensors and Interfacing** – Instrumentation and control systems, Transducers, Sensors. **Text 1: Chapter 15** **Actuators,** LED, 7-Segment LED Display, Stepper Motor, Relay, Piezo Buzzer, Push Button Switch, Keyboard. **Text 2:** 2.3.2, 2.3.3.1 to 2.3.3.8 **except 2.3.3.3** **Communication Interface**, UART, Parallel Interface, USB, Wi-Fi, GPRS. **Text 2:** 2.4, 2.4.1.3, 2.4.1.5, 2.4.2.2, 2.4.2.6, 2.4.2.8.	
Teaching-Learning Process	Chalk and talk method, Power Point Presentation, YouTube videos Pictures of sensors, actuators, microcontrollers (with manufacturer names) Self-study topics: Block diagrams of the architectures of RISC, CISC, Harvard and Von-Neumann, Actuator types, LCD, Touch screen displays

<table>
<tr><th colspan="2">Module IV</th></tr>
<tr><td colspan="2">Analog and Digital Communication – Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Softwired, Noise, Receiver, Multiplexing, Types of communication systems.
Text 3: 1.2, 1.2.1, 1.3, 1.4 – 1.4.1, 1.4.2, 1.5, 1.5.2, 1.6, 1.14, 1.15

From Summary portion of Chapter 1 of Text 3:
Types of modulation (only concepts) – AM (only 2.2, no 2.2.1 and rest), FM, Phase Modulation, Pulse Modulation, PAM (Fig. 6.5b), PWM (Fig. 6.8), PPM, PCM.
Concept of Radio wave propagation (Ground, space, sky with Fig. 1.28)

From Summary portion of Chapter 6 – Digital Communication of Text 3:
Concepts of Sampling theorem, Nyquist rate, Digital Modulation Schemes (also see 6.12) – ASK, FSK, PSK
Radio signal transmission – Text 3: 6A.1.1, Fig. 6A.1, Fig. 6A.3
Multiple access techniques – Text 3: 6A.1.4, 6A.1.5
Multipath and fading – Text 3: 6A.2.1
Error Management – Text 3: 6A.3.1, 6A.3.2
Antenna, Types of antennas – Text 3: 13.1, 13.3 (only definition and antenna model, exclude radiation patterns).</td></tr>
<tr><td>Teaching-Learning Process</td><td>Chalk and talk method, PowerPoint Presentation, YouTube videos
Self-study topics: Multiplexing techniques – TDM, FDM, CDM, WDM, OFDM</td></tr>
<tr><th colspan="2">Module V</th></tr>
<tr><td colspan="2">Cellular Wireless Networks - Introduction, cellular telephone system, cellular concept and frequency reuse. Text 3: 8.1, 8.2, 8.3
Wireless Network Topologies - First Generation (1G) Technology, Second Generation (2G) Technology, GSM Communications, GSM System architecture, Third Generation (3G) Technology, CDMA Technology, High-level architecture of LTE, Fourth Generation (4G) Technology, Wireless LAN, Bluetooth, Bluetooth Architecture. Text 3: 8.4, 8.5, 8.6, 8.7, 8.7.2, 8.9, 8.10, 8.12, 8.15, 8.16, 8.17, 8.17.1
Satellite Communication – Elements of Satellite Communication, Types of satellites – GEO, LEO, MEO. Text 3: 9.1, 9.4, 9.12 - 9.12.1, 9.12.2, 9.12.3
Optical Fiber Communication - A fiber optic Communication system. Text 3: 10.15 – 10.15.1 to 10.15.9
Microwave Communication – Introduction, Frequency modulated microwave communication system. Text 3: 11.1, 11.7.1</td></tr>
<tr><td>Teaching-Learning Process</td><td>Chalk and talk method, PowerPoint Presentation, YouTube videos
Self-study topics: 5G</td></tr>
</table>

Course outcomes (Course Skill Set):

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

1. Describe the concepts of electronic circuits encompassing power supplies, amplifiers and oscillators.
2. Present the basics of digital logic engineering including data representation, circuits and the microcontroller system with associated sensors and actuators.
3. Discuss the characteristics and technological advances of embedded systems.
4. Relate to the fundamentals of communication engineering spanning from the frequency spectrum to the various circuits involved including antennas.
5. Explain the different modes of communications from wired to wireless and the computing involved.

Assessment Details (both CIE and SEE)

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

Continuous Internal Evaluation (CIE):

Proposed Activities to be carried out for 10 marks of CIE:

Students should construct and make the demo of the following circuits in a group of 3/4 students:

1. +5V power supply unit using Bridge rectifier, capacitor filter, and IC 7805.
2. To switch on/off an LED using a diode in forwarding / reverse bias using a battery cell.
3. Transistor switch circuit to operate a relay that switched off/on an LED.
4. IC 741 Integrator circuit / comparator circuit.
5. To operate a small loudspeaker by generating oscillations using IC 555.

Note: Following experiments to be executed using Multisim/Pspice/EDA/Proteus or any suitable Software

Using suitable simulation software, demonstrate the operation of the following circuits:

1. Half / full-wave rectifier using diodes
2. Voltage multipliers
3. Op-amp circuits – inverting, non-inverting amplifiers, summers, differentiators, oscillators.
4. Flip-flops – all types
5. Shift registers and counters
6. AM and FM modulation and demodulation

The CIE marks awarded in the case of Laboratory shall be based on the weekly evaluation of laboratory journals/ reports after the conduction of every experiment and one/ two practical test(s).

Semester End Examination:

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

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books:

1. Mike Tooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015. DOI https://doi.org/10.4324/9781315737980. eBook ISBN9781315737980
2. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016.
3. S L Kakani and Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017. https://elib4u.ipublishcentral.com/pdfreader/communication-systems
4. D P Kothari, I J Nagrath, 'Basic Electronics', 2nd edition, McGraw Hill Education (India), Private Limited, 2018.

Note: E-book versions are available at 'https://www.knimbus.com/' of the VTU consortium. Remote login available through respective college IDs.

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

Developing electronic applications using Raspberry Pi – **Text 1: Chapter 18**

Google Drive Link

https://drive.google.com/drive/folders/1aTCPv2Bf5M-k40IAYfE0cgZwBjcpAZcR?usp=sharing

ELEMENTS OF MECHANICAL ENGINEERING			
Course Code	21EME15/25	CIE Marks	50
Teaching Hour/Week (L: T:P:S)	2:0:2:0	SEE Marks	50
Total Hours of **Teaching-Learning**	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning Objectives:

The course will enable the students to

CLO 1. Acquire a basic understanding role of Mechanical Engineering in the industry and **society**

CLO 2. Acquire a basic understanding of the formation of steam and its industrial application.

CLO 3. Acquire a basic understanding of renewable energy resources and basic concepts of Hydraulic turbines.

CLO 4. Acquire knowledge of various engineering materials and metal joining techniques.

CLO 5. Acquire essential experience with heat transfer devices.

CLO 6. Acquire knowledge on automobile technology in transport application and basics of Refrigeration and Air-Conditioning.

CLO 7. Acquire essential experience on basic Power transmission systems, including mechanical linkages.

CLO 8. Acquire knowledge of basic concepts on manufacturing principles and machine tools and their advancement.

Teaching-Learning Process (General Instruction):

1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
2. Chalk and Talk method for Problem Solving.
3. Arrange visits to show the live working models other than laboratory topics.
4. Adopt collaborative (Group Learning) Learning in the class.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

Module 1

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 and contribute to the GDP.

Steam Formation and Application:

Formation of steam and thermodynamic properties of steam (Simple Problems using Steam Tables), Applications of steam in industries namely, Sugar industry, Dairy industry, Paper industry, Food processing industry for Heating/Sterilization, Propulsion/Drive, Motive, Atomization, Cleaning, Moisturization, Humidification

Energy Sources and Power Plants:

Review of energy sources; Construction and working of Hydel power plant, Thermal power plant, Nuclear power plant, Solar power plant, Tidal power plant, Wind power plant.

Introduction to basics of Hydraulic turbines and pumps:

Principle and Operation of Hydraulic turbines, namely, Pelton Wheel, Francis Turbine and Kaplan Turbine. Introduction to working of Centrifugal Pump.	
Laboratory Components: 1. *Visit any one Conventional or Renewable Energy Power Plant and prepare a comprehensive report.* 2. *Demonstration of Components of any one Turbo-machine through Cut Sections.* 3. *Visit to an Industry using steam for their process and prepare a comprehensive report.*	
Teaching-Learning Process	1. Power-point Presentation, 2. Video demonstration or Simulations, 3. Chalk and Talk are used for Problem Solving (In-general). 4. Laboratory Demonstrations and Practical Experiments
Module 2	
Properties, Composition, and Industrial Application of Engineering Materials: **Metals**-Ferrous: Tool steels and stainless steels. Non-ferrous /metals: aluminum alloys. **Ceramics**- Glass, optical fiber glass, cermets. **Composites**- Fiber reinforced composites, Metal matrix Composites. Smart materials- Piezoelectric materials, shape memory alloys, semiconductors, and super-insulators. **Metal Joining Processes:** **Soldering, Brazing and Welding**: Definitions. Classification and methods of soldering, brazing, and welding. Brief description of arc welding, Oxy-acetylene welding, Introduction to TIG welding and MIG welding. **Heat Transfer Applications:** Review of modes of Heat Transfer; Automobile Radiators; Condensers and evaporators of refrigeration systems; Cooling of Electrical and Electronic Devices; Active, Passive, and Hybrid Cooling.	
Laboratory Components 1. *One exercise each involving Welding, Soldering, and Brazing.* 2. *Study oxy-acetylene gas flame structure and its application to gas welding* 3. *Demonstration of **anyone** Heat transfer application device and prepare a comprehensive report.*	
Teaching-Learning Process	1. PowerPoint Presentation, 2. Video demonstration or Simulations, 3. Chalk and Talk are used for Problem Solving (In-general). 4. Laboratory Demonstrations and Practical Experiments
Module 3	
Fundamentals of IC Engines: Review of Internal Combustion Engines, 2-Strokes and 4-Strokes engines, Components and working principles, Application of IC Engines in Power Generation, Agriculture, Marine and Aircraft Propulsion, Automobile. **Insight into future mobility technology;** Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles, Drives and Transmission. Advantages and disadvantages of EVs and Hybrid vehicles. **Refrigeration and Air-Conditioning:** Principle of refrigeration, Refrigeration effect, Ton of Refrigeration, COP, Refrigerants and their desirable properties. Principles and Operation of Vapor Compression and Vapor absorption refrigeration. Domestic and Industrial Applications of Refrigerator.	

Working Principles of Air Conditioning, Classification, and Applications of Air Conditioners. Concept and operation of Centralized air conditioning system,

Laboratory Components:

1. *Study of Engine Components through Cut Sections*
2. *Demonstrate Components and Working principles of Domestic Refrigerator and prepare a comprehensive report **OR** Study/visit any commercial centralized Air-Conditioning unit, understand various components and operations, and prepare a comprehensive report.*

Teaching-Learning Process	1. PowerPoint Presentation, 2. Chalk and Talk are used for Problem Solving (In-general). 3. Video demonstration or Simulations, 4. Laboratory Demonstrations and Practical Experiments

Module 4

Mechanical Power Transmission:

Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio,

Gear Trains and their application: simple and compound Gear Trains, Simple numerical problems on Gear trains involving velocity ratios

Belt Drives: Components of belt drive and concept of velocity ratio; Types of belt drives, Flat-Belt Drive, V-Belt Drive and Application of Belt Drives.

Simple numerical problems on Belt drives involving velocity ratios,

Concept of Chain, Rope drives and their applications

Fundamentals of Mechanical Linkages: Definitions of Machines and Mechanisms. Applications of linear motion, oscillatory motion, rotary motion, ratchet and latches, clamping, reverse motion, pause and hesitation, loading and unloading Mechanisms.

Introduction to Robotics:

Robot anatomy, Joints & links, common Robot configurations. Applications of Robotics in Material Handling, Processing, Assembly, and Inspection.

Laboratory Components:

1. *Demonstration of the machine consists of Gear Trains.*
2. *Demonstration of various elementary mechanisms and their motion.*
3. *Demonstration of any one model of Robot*

Teaching-Learning Process	1. PowerPoint Presentation, 2. Chalk and Talk are used for Problem Solving (In-general).. 3. Video demonstration or Simulations, 4. Laboratory Demonstrations and Practical Experiments

Module 5

Fundamentals of Machine Tools and Operations:

Fundamentals of Machining and machine tools,

Construction and Working Principle of Lathe, Various Lathe Operations: Turning, Facing, Taper Turning and Knurling.

Construction and Working of Milling Machines and applications.

Construction and working of simple Drilling Machines and applications.

(Sketches of layout need not be dealt with for all machine tools)

Introduction to Modern Manufacturing Tools and Techniques:

CNC: Introduction, components of CNC, advantages and applications of CNC, CNC Machining centres and Turning Centers

Concepts of Smart Manufacturing and Industrial IoT.

Introduction to Mechatronics: Concept of open-loop and closed-loop systems, Examples of Mechatronic systems and their working principle.

Laboratory Components:

1. *Demonstration of developing one model involving Lathe, Milling and Drilling*
2. *Study/Visit an Industry using CNC/ modern techniques and submit a report*
3. *Carry out a Case study on anyone Mechatronics device and prepare a comprehensive report.*

Teaching-Learning Process	1. PowerPoint Presentation, 2. Chalk and Talk are used for Problem Solving (In-general). 3. Students are encouraged to practice only line diagrams for exams. 4. Video demonstration or Simulations, 5. Laboratory Demonstrations and Practical Experiments

Course Outcomes:

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

CO 1. Understand basic concepts of mechanical engineering in the fields of energy and its utilization, materials technology, manufacturing techniques, and transmission systems through demonstrations.

CO 2. Understand the application of energy sources in Power generation and utilization, Engineering materials, manufacturing, and machining techniques leading to the latest advancements and transmission systems in day to day activities

CO 3. Apply the skills in developing simple mechanical elements and processes

Assessment Details both (CIE and SEE):

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

Continuous Internal Evaluation: Theory: 30marks and Lab Component: 20 marks= Total 50 marks

1. Topics taught by Lecture hours need to be assessed by
2. Three tests each for a duration of one hour and an average of the marks scored is reduced to 20
3. Any two ***Activities*** Namely quizzes, Assignment, seminar/ presentation, mini-project leading to demonstration will be considered for 10 marks.
4. Practical Sessions need to be assessed by appropriate rubrics and viva-voce methods. This will contribute to 20 marks. ***Note: Minimum of 80% of the laboratory components have to be covered.***
    - Rubrics for each Experiment taken average for all Lab components – 15 Marks
    - Viva-Voce– 5 Marks (more emphasized on demonstration topics)

Semester End Examination:

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

- The question paper will have ten questions. Each question is set for 20 marks.

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

The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. Non-Conventional Energy Sources, G.D Rai, Khanna Publishers, 2003
3. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
4. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012
5. Turbo Machines, M. S. Govindegowda and A. M. Nagaraj, M. M. Publications 7Th Ed, 2012
6. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.
7. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017
8. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1
9. Web-links
   - (https://www.tlv.com/global/TI/steam-theory/principal-applications-for-steam.html
   - https://www.forbesmarshall.com/Knowledge/SteamPedia/About-Steam/Fundamental-Applications-of-Steam
   - https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing-and-process-industry/)
   - Videos | Makino (For Machine Tool Operation)
   - mechanisms and mechanical devices 4e.pdf (e-book- Mechanical Linkages)

Additional References:

10. Basic and Applied Thermodynamics, P.K.Nag, Tata McGraw Hill 2nd Ed., 2002
11. Standard Handbook of Machine Design, Joseph E Shigley; Charles R Mischke, Thomas H Brown, Jr., McGraw-Hill, New York, 2004.
12. Thermal Management in Electronic Equipment, HCL Technologies, 2010
13. Thermal Management of Microelectronic Equipment, L. T. Yeh and R. C. Chu, ASME Press, New York, 2002
14. Fundamentals of Robotics: Analysis and Control, Robert J. Schilling, Pearson Education (US).

ENGINEERING CHEMISTRY LABORATORY			
Course Code	**21CHEL16/26**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2	SEE Marks	50
Credits	01	Exam Hours	3hrs

Course objectives:

CLO1	Quantitative analysis of materials by volumetric and chemical method.
CLO2	Instrumental methods for developing experimental skills in building technical competence

Sl.NO	Instrumentation Experiments
1	Estimation of FAS Potentiometrically using standard $K_2Cr_2O_7$ solution.
2	Estimation of Acids in acid mixture Conductometrically.
3	Determination of Viscosity coefficient of a given liquid using Ostwald's viscometer
4	Estimation of copper Colorimetrically.
5	Determination of pKa value of a given weak acid using pH meter
	Volumetric experiments
1	Estimation of Total hardness of water by EDTA complexometric method.
2	Determination of Nickel using EDTA by complexometric method
3	Determination of percentage of copper in brass using standard sodium thiosulphate solution.
4	Determination of Chemical oxygen demand of industrial waste water.
5	Estimation of percentage of iron in the given rust solution using standard Potassium Dichromate solution (External indicator method)
	Demonstration Experiments (For CIE only)
1	Estimation of Sodium & Potassium in the given sample of water using Flame Photometer.
2	Synthesis of nanomaterial by Precipitation method.

Course outcomes (Course Skill Set):

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

CO1	Determine the pKa and coefficient of Viscosity of a given organic liquid.
CO2	Estimate the amount of substance present in the given solution using Potentiometer Conductometric and Colorimetric.
CO3	Determine the total hardness and chemical oxygen demand in the given solution by volumetric analysis method
CO4	Estimate the percentage of Nickel, copper and Iron in the given analyte solution by titration method.
CO5	Demonstrate flame photometric estimation of sodium & potassium and the synthesis of nanomaterials by Precipitation method.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination(SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in **Annexure-II of Regulation book**
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Suggested Learning Resources:

Text Books:

1 Vogel's A.I. A text book of quantitative analysis, 35th edition, 2012.
2 Willard, Merit, Dean and Settle, A text book of Instrumental analysis, 6th edition 2012.

Reference books:

1. G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. A text book of quantitative analysis, Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.
2. Gary D Christian, Analytical Chemistry, Wiley India, 6th edition, 2015.
3. T. Pradeep, A Text book of Nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt., Ltd., 1st edition, 2015

I/II Semester

COMPUTER PROGRAMMING LABORATORY			
Course Code	**21CPL27/17**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Total Hours of Pedagogy	--	Total Marks	100
Credits	01	Exam Hours	03

Course Objectives:

1. Explain problem statements and identify appropriate solutions
2. Demonstrate the use of IDE, C Compiler, and identify and rectify the syntax and syntactic errors during programming.
3. Development of algorithms and programs using constructs of C programming language
4. Reporting the observations

Sl. No.	**Practise Programs**
	• Calculation of Simple Interest, • Check whether the given number is even or odd • Convert string case • Check for palindrome, prime number, perfect square. • Development of linear search algorithm Etc…
	PART A – List of problems for which student should develop program and execute in the Laboratory
1	Simulation of a SimpleCalculator.
2	Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
3	An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
4	Implement Binary Search on Integers / Names.
5	Implement Matrix multiplication and validate the rules of multiplication.
6	Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
7	Sort the given set of N numbers using Bubble sort.
8	Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.
9	Implement structures to read, write and compute average- marks and the students scoring above and below the average marks for a class of N students.
10	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
11	Implement Recursive functions for Binary to Decimal Conversion.
	PART B – Practical Based Learning
1	A problem statement for each batch is to be generated in consultation with the co-examiner and student should develop an algorithm, program and execute the program for the given problem with appropriate outputs.

Course Outcome (Course Skill Set)

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

1. Define the problem statement and identify the need for computer programming
2. Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming
3. Develop algorithm, flowchart and write programs to solve the given problem
4. Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.

5. Document the inference and observations made from the implementation.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 35% (18 Marks out of 50) in the semester-end examination (SEE).

Continuous Internal Evaluation (CIE):

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled downed to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability. Rubrics suggested in Annexure-II of Regulation book
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- *Students can pick one experiment from the questions lot of PART A with equal choice to all the students in a batch. For PART B examiners should frame a question for each batch, student should develop an algorithm, program, execute and demonstrate the results with appropriate output for the given problem.*

- *Weightage of marks for PART A is 80% and for PART B is 20%.General rubrics suggested to be followed for part A and part B.*
- Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero (Not allowed for Part B).
- The duration of SEE is 03 hours

Rubrics suggested in Annexure-II of Regulation book

Suggested Learning Resources:

1. YashavanthKanetkar, Let us C, Authentic Guide to C Programming Langauge, bpb publisher, 17th Edition, 2020.
2. Herbert Schildt, C: The complete reference, Mc Graw Hill, 4th Edition, 2017
3. Programming in C , Reema Theraja

Web links and Video Lectures (e-Resources):

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171/

II Semester - BE

Professional Writing Skills in English			
Course Code	**21EGH28**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:0:0	SEE Marks	50
Total Hours of Pedagogy	02 Hours/Week	Total Marks	100
Credits	02	Exam Hours	2 hour

Course objectives:

The course (21EGH28) will enable the students ,

- To Identify the Common Errors in Writing and Speaking of English.
- To Achieve better Technical writing and Presentation skills for employment.
- To read Technical proposals properly and make them to Write good technical reports.
- Acquire Employment and Workplace communication skills.
- To learn about Tequniqes of Information Transfer through presentation in different level.

Language Lab : To augment LSRW, grammar and Vocabulary skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred as per the AICTE / VTU guidelines.

Teaching-Learning Process (General Instructions)

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

- ✓ Teachers shall adopt suitable pedagogy for effective teaching - learning process. The pedagogy shall involve the combination of different methodologies which suit modern technological tools and software's to meet the present requirements of the Global employment market.
  (i) Direct instructional method (Low /Old Technology),
  (ii) Flipped classrooms (High/advanced Technological tools),
  (iii) Blended learning (combination of both),
  (iv) Enquiry and evaluation based learning,
  (v) Personalized learning,
  (vi) Problems based learning through discussion,
  (vii) Following the method of expeditionary learning Tools and techniques,
  (viii) Use of audio visual methods through language Labs in teaching of of LSRW skills.
- ✓ Apart from conventional lecture methods, various types of innovative teaching techniques through videos, animation films may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills in teaching of communicative skills in general.

Module-1

Identifying Common Errors in Writing and Speaking English :

- Advanced English Grammar for Professionals with exercises, Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules with Exercises).
- Common errors in Subject-verb agreement, Noun-pronoun agreement, Sequence of Tenses and errors identification in Tenses. Advanced English Vocabulary and its types with exercises – Verbal Analogies, Words Confused/Misused.

Teaching - Learning Process	Chalk and talk method, Power Point presentation to teach Communication skills (LSRW Skills), Creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Module-2

Nature and Style of sensible writing :

- Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indianism in English Communication, Creating Coherence and Cohesion, Sentence arrangements exercises, Practice of Sentence Corrections activities. Importance of Summarising and Paraphrasing.
- Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words, Common errors in the use of Idioms and phrases, Gender, Singular & Plural. Redundancies & Clichés.

Teaching-Learning Process	Chalk and talk method, PowerPoint presentation and Animation videos to teach phonetics in Practical method, creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Module-3

Technical Reading and Writing Practices :

- Reading Process and Reading Strategies, Introduction to Technical writing process, Understanding of writing process, Effective Technical Reading and Writing Practices , Introduction to Technical Reports writing, Significance of Reports, Types of Reports.
- Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process.
- Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.

Teaching-Learning Process	Chalk and talk method, Power Point presentation to teach Grammar, Animation videos on communication and language skills, creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Module-4

Professional Communication for Employment :

- The Listening Comprehension, Importance of Listening Comprehension, Types of Listening, Understanding and Interpreting, Listening Barriers, Improving Listening Skills. Attributes of a good and poor listener.
- Reading Skills and Reading Comprehension, Active and Passive Reading, Tips for effective reading.
- Preparing for Job Application, Components of a Formal Letter, Formats and Types of official, employment, Business Letters, Resume vs Bio Data, Profile, CV and others, Types of resume, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types.

Teaching-Learning Process	Chalk and talk method, PowerPoint presentation to teach Grammar and phonetics, Animation videos on communication and language skills, creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Module-5

Professional Communication at Workplace :

- Group Discussions – Importance, Characteristics, Strategies of a Group Discussions. Group Discussions is a Tool for Selection. Employment/ Job Interviews - Importance, Characteristics, Strategies of a Employment/ Job Interviews. Intra and Interpersonal Communication Skills - Importance, Characteristics, Strategies of a Intra and Interpersonal Communication Skills. Non-Verbal Communication Skills (Body Language) and its importance in GD and PI/JI/EI.
- Presentation skills and Formal Presentations by Students - Importance, Characteristics, Strategies of Presentation Skills. Dialogues in Various Situations (Activity based Practical Sessions in class by Students).

Teaching-Learning Process	Chalk and talk method, Power Point presentation to teach Grammar and phonetics, Animation videos on communication and language skills, creating real time stations in classroom discussions, Giving activities and assignments (Connecting Campus & community with companies real time situations).

Course outcome (Course Skill Set)

At the end of the course (21EGH28) the student will be able :

1. To understand and identify the Common Errors in Writing and Speaking.
2. To Achieve better Technical writing and Presentation skills.
3. To read Technical proposals properly and make them to Write good technical reports.
4. Acquire Employment and Workplace communication skills.
5. To learn about Techniques of Information Transfer through presentation in different level.

Assessment Details (both CIE and SEE)

Continuous internal evaluation (CIE) needs to be conducted for 50 marks like Engineering courses. The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The student has to obtain a minimum of 40% of maximum marks in CIE and 35% of maximum marks in SEE to pass. MCQ Pattern (Multiple Choice Questions) Semester End Exam (SEE) is conducted for 50 marks (120 minutes duration). Based on this grading will be awarded.

Continuous Internal Evaluation (CIE) :

Three Unit Tests each of **20 Marks (duration 01 hour**)

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

All the tests are preferred similar to SEE pattern; however, the teacher may follow test pattern similar to other theory courses of Engineering

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Report writing /Group discussion/Seminar any one of three suitably planned to attain the COs and POs for **20 Marks** (**duration 01 hours**)

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

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

Semester End Examination (SEE) :

SEE paper will be set for 100 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is 120 minutes**.** Marks scored are scaled down to 50 Marks. *(Time duration may be made 90 minutes to train the students for engineering / non-engineering competitive examination)*

1. Professional Writing Skills in English has become a very important component in all engineering and non-engineering competitive examinations. In exams like GRE, TOEFL, IELTS and GATE exam, all state and Central Government recruitment examinations, placement tests and other Examinations, so the pattern of question paper, in general, will be in multiple-choice question (MCQ) Pattern. So, to meet the relevance of the recruitment requirement of our Engineering students "Professional writing skill in English" Semester end examination (SEE) will be conducted in a multiple choice question (MCQ) pattern.
2. MCQ Pattern (Multiple Choice Questions) Semester End Exam (SEE) is conducted for 50 marks (120 minutes duration).

Suggested Learning Resources :

1. **A Course in Technical English,** Cambridge University Press – 2020.
2. **Functional English** (**As per AICTE 2018 Model Curriculam**) Cengage learning India Pvt Limited [Latest Revised Edition] - 2020.
3. **Communication Skills** by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018. **Refer it's workbook** for activities and exercises – "Communication Skills – I (A Workbook)" published by Oxford University Press – 2018.
4. **Professional Writing Skills in English,** Infinite Learning Solutions – (Revised Edition) 2021.
5. **Technical Communication** – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
6. **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd – 2015.
7. **Effective Technical Communication** – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.
8. **Intermediate Grammar, Usage and Composition** by M.L.Tichoo, A.L.Subramanian, P.R.Subramanian, Orient Black Swan – 2016.

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

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions, Seminars and assignments