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www.uni-mysore.ac.in

UNIVERSITY OF MYSORE
Estd. 1916

VishwavidyanilayaKaryasoudha
Crawford Hall, Mysuru- 570 005

No.AC2(S)/55/2024-25

Dated: 08.07.2025

Notification

Sub:-Syllabus and Scheme of Examinations for I & II Semester of all B.E. programmes in MUSE programme from the Academic year 2025-26.

Ref:- Decision of Boards of Studies in

1. Artificial Intelligence and Machine Learning meeting held on 21-05-2025.
2. Artificial Intelligence and Data Science (AI & DS) meeting held on 24-05-2025.
3. Biomedical and Robotic Engineering meeting held on 20-05-2025.
4. Basic Science Engineering meeting held on 20-05-2025.
5. Computer Science and Design (CS & D) meeting held on 23-05-2025.
6. Civil Environmental Engineering meeting held on 19-05-2025.
7. Decision of the Faculty of School of Engineering meeting held on 10-06-2025.
8. Decision of the Academic Council meeting held on 30-06-2025.

*****

The above mentioned Boards of Studies at their meetings have resolved to recommend and approved the I & II Semester Syllabus and Scheme of Examinations for all B.E. programmes in MUSE from the Academic year 2025-26.

The Faculty of School of Engineering and Academic Council at their meetings held on 10-06-2025and 30-06-2025 respectively, has also approved the above said Syllabus and Scheme of Examinations, hence it is hereby notified.

The Syllabus and Scheme of Examinations content may be download from the University Website www.uni-mysore.ac.in.

Registrar

Registrar
University of Mysore
Mysore

To;

1. The Registrar (Evaluation), University of Mysore, Mysuru.
2. The Chairman, BOS in Artificial Intelligence and Machine Learning, Manasagangothri, Mysore.
3. The Chairman, BOS in Artificial Intelligence and Data Science (AI & DS), Manasagangothri, Mysore.
4. The Chairman, BOS in Biomedical and Robotic Engineering MUSE, Manasagangothri, Mysore.
5. The Chairman, BOS in Basic Science Engineering, Manasagangothri, Mysore.
6. The Chairman, BOS in Computer Science and Design (CS & D) Manasagangothri, Mysore.
7. The Chairman, BOS in Civil Environmental Engineering, Manasagangothri, Mysore.
8. The Director, Mysore University School of Engineering, Manasagangothri, Mysore.
9. The Dean, Faculty of Engineering, DOS in MGM.
10. The Director, ICD, MGM-Request to publish this Notification in university website.
11. The Deputy Registrar/Assistant Registrar/Superintendent, Administrative Branch and Examination Branch, University of Mysore, Mysuru.
12. The PA to Vice-Chancellor/ Registrar/ Registrar (Evaluation), University of Mysore, Mysuru.
13. Office Copy.

University of Mysore

Scheme & Syllabus for First Year B.E Degree Programme (As per NEP-2020)

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

Effective from the Academic Year 2025-26

Mysore University School of Engineering

Manasagangotri Campus, Mysuru.

MYSORE UNIVERSITY SCHOOL OF ENGINEERING
Scheme of Teaching and Examinations 2025
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2025–26)

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 L	Tutorial T	Practical/ Drawing P	Self-Study S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	BSC	BMAT101	**Engineering Mathematics-I**	TD and PSB: Mathematics	3	-	2		03	50	50	100	4
2	BSC	BPHY102	Engineering Physics	TD and PSB: Physics	2	2	--		03	50	50	100	3
3	ESC	BELE103	Basic Electrical Engineering	TD and PSB: E and E Engineering	2	2	--		03	50	50	100	3
4	ESC	BCIV104	Elements of Civil Engineering	TD and PSB: Civil Engineering	3	--	--		03	50	50	100	3
5	ESC	BCED105	Computer Aided Engineering Drawing	TD: ME, Mfg. Engineering PSB: Mechanical Engg	2	0	2		03	50	50	100	3
6	BSC	BPHYL106	Engineering Physics Laboratory	TD and PSB: Physics	--	--	2		03	50	50	100	1
7	ESC	BELEL107	Basic Electrical & Electronics Engineering Laboratory	TD and PSB: E & E, ECE	--	--	2		03	50	50	100	1
8	HSMC	BEGH108	Communicative English	TD and PSB: Humanities	1	--	--		--	50	--	50	1
9	AEC	BIDT109/209	Innovation and Design Thinking	Any Engineering Department	1	--	--		--	50	--	50	1
		OR											
		BSFH109/209	Scientific Foundations of Health										
				TOTAL	14	04	08		21	450	450	800	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. 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 Activity Point Programme. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to university. 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.

In case students fail to earn the prescribed activity Points, an Eighth semester Grade Card shall be issued only after earning the required activity Points. Students shall be admitted for the award of the degree only after the release of the Eighth semester Grade Card.

Summer Internship – I & II: All the students admitted to engineering programmes shall have to undergo a mandatory internship of **04 weeks** during the intervening vacation of IV and V semesters, and VI & VII semesters. Summer Internships shall include Inter / Intra Institutional activities. A University Viva-voce examination (Presentation followed by question-answer session) shall be conducted for Internship-I during 5th sem & Internship-II during 8th sem respectively, and the prescribed credit shall be included accordingly in 5th semester and 8th semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements. (The faculty coordinator or mentor has to monitor the students' internship progress and interact to guide them for the successful completion of the internship.)

MYSORE UNIVERSITY SCHOOL OF ENGINEERING
Scheme of Teaching and Examinations 2025
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2025–26)

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	BMAT201	**Engineering Mathematics-II**	TD and PSB: Mathematics	3	0	2		03	50	50	100	4
2	BSC	BCHE202	Engineering Chemistry	TD and PSB: Chemistry	2	2	--		03	50	50	100	3
3	ESC	BCPS203	C Programming for Problem Solving	TD and PSB: Computer Science and Engineering	3	--	--		03	50	50	100	3
4	ESC	BELN204	Basic Electronics & Communication Engineering	TD: ECE/E and I/ TC, PSB: ECE	2	2	--		03	50	50	100	3
5	ESC	BEME205	Elements of Mechanical Engineering	TD: ME, Auto, IP,IEM, Mfg . Engineering PSB: Mechanical Engg	2	2	--		03	50	50	100	3
6	BSC	BCHEL206	Engineering Chemistry Laboratory	TD and PSB: Chemistry	--	--	2		03	50	50	100	1
7	ESC	BCPL207	Computer Programming Laboratory	TD and PSB: Computer Science and Engineering	--	--	2		03	50	50	100	1
8	HSMC	BEGH208	Professional Writing Skills in English	TD and PSB: Humanities	1	--	--		--	50	--	50	1
9	AEC	BSFH109/209	Scientific Foundations of Health	Any Department	1	--	--		--	50	--	50	1
		OR											
		BIDT109/209	Innovation and Design Thinking										
				TOTAL	**14**	**06**	**06**		**21**	**450**	**350**	**800**	**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

<table>
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1hour Lecture <b>(L)</b> per week = <b>1 Credit</b>
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(b) <b>Three credit</b> courses are to be designed for <b>40</b> hours of Teaching – Learning process.
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<tr><td colspan="2"><b>AICTE Activity Points to be earned by students admitted to BE/B.Tech. programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines):</b>
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 Activity Point Programme. Students transferred from other Universities to the fifth semester are required to earn 50 Activity Points from the year of entry to university. 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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<tr><td colspan="2"><b>Summer Internship – I & II:</b> All the students admitted to engineering programmes shall have to undergo a mandatory internship of <b>04 weeks</b> during the intervening vacation of IV and V semesters, and VI & VII semesters. Summer Internships shall include Inter / Intra Institutional activities. A University Viva-voce examination (Presentation followed by question-answer session) shall be conducted for Internship-I during 5th sem & Internship-II during 8th sem respectively, and the prescribed credit shall be included accordingly in 5th semester and 8th semester. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up / complete the internship shall be declared fail and shall have to complete during subsequent University examination after satisfying the internship requirements. (The faculty coordinator or mentor has to monitor the students’ internship progress and interact to guide them for the successful completion of the internship.)</td></tr>
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MYSORE UNIVERSITY SCHOOL OF ENGINEERING
Scheme of Teaching and Examinations 2025
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2025–26)

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	
					L	T	P	S					
1	BSC	BMAT101	**Engineering Mathematics-I**	TD and PSB: Mathematics	3	--	2		03	50	50	100	4
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7	ESC	BCPL107	Computer Programming Laboratory	TD and PSB: Computer Science and Engineering	--	--	2		03	50	50	100	1
8	HSMC	BEGH108	Communicative English	TD and PSB: Humanities	1	--	--		--	50	--	50	1
9	AEC	BIDT109/209	Innovation and Design Thinking	Any Engineering Department	1	--	--		--	50	--	50	1
		OR											
		BSFH109/209	Scientific Foundations of Health										
				TOTAL	**14**	**04**	**08**		**21**	**450**	**350**	**800**	**20**

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

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Scheme of Teaching and Examinations 2025
Outcome-Based Education(OBE) and Choice Based Credit System (CBCS)
(Effective from the academic year 2025–26)

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
					Theory Lecture L	Tutorial T	Practical/ Drawing P	Self-Study S	Duration in hours	CIE Marks	SEE Marks	Total Marks	
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		OR											
		BIDT109/209	Innovation and Design Thinking										
				TOTAL	**14**	**04**	**08**		**24**	**450**	**350**	**800**	**20**

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Engineering Mathematics - I		Semester	I
Course Code	**BMAT101**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Total Marks	100
Credits	4	Exam Hours	3
Examination nature (SEE)	**Theory**		

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

- Explain the basic concepts of calculus for a single and multivariable function, ordinary differential equations, infinite series, numerical methods and linear algebra.
- Apply the above concepts of the syllabus in their respective branches of engineering.
- Analyse the solutions of engineering problems using these concepts.
- Use modern tool to solve/analyse engineering problems from the concepts of calculus, numerical methods, and linear algebra.

Teaching-Learning Process (General Instructions)

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

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Videodemonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

MODULE-1

Differential Calculus

Partial Differentiation: Basics; Euler's theorem of first kind (only problems); Total derivatives; Jacobian; Maclaurin's series of one and two variables; Differentiation under Integral sign.

Applications: Problems on evaluation of non-elementary integrals using Maclaurin's series.

MODULE-2

Ordinary Differential Equations (ODEs)

Linear Equations: Bernoulli's equation; Exact Equations; Reducible to Exact (If of the form $x^a y^b$); Orthogonal Trajectory (Cartesian only); and Newton's law of cooling.

Non- Linear Equations: Solvable for p, Clairaut's form (singular, general solution).

Applications: Problems on LR circuits leading to linear differential equations.

MODULE-3

Integral Calculus

Multiple Integrals: Double integrals, changing the order of integration, changing Cartesian form to polar form. Special Functions- Beta and Gamma Functions, relation between beta and gamma functions, properties, and its problems (related to reduction formula of definite integrals). Triple integral (simple problems)

Applications: Calculation of optimum value in various geometries.

MODULE-4

Numerical methods and Infinite Series

Numerical methods: Types of errors in numerical methods, Solution of Algebraic and Transcendental Equations: Newton- Raphson method. Finite Differences: Newton's Forward and Backward Interpolation, Lagrange's Interpolation. Numerical Integration- Simpson's 1/3rd rule.

Infinite Series: Convergence of infinite series: D-Alembert's Ratio Test, Raabe's Test, Leibniz test, absolute and conditional convergence.

Applications: Problems on application of Newton-Raphson method to some physical contexts.

MODULE 5

Linear Algebra

Vectors, linearly dependent and independent vectors, Solution to systems of Linear Equations: Rank, Consistency, Gauss Elimination, LU decomposition. Eigen values- Eigen vectors, Diagonalization (Square matrix of order 2 only), Gauss–Seidel Method, Rayleigh Power method.

Applications: Problems on Kirchhoff's law leading to solving system of linear equations.

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Suggested software: Free and Open-Source Software (FOSS) tools like Mathematica/MATLAB/Python/Scilab.

Sl.NO	Experiments
1	Arithmetic Operations.
2	Symbolic Variables and Functions.
3	Plotting Graphs- 2D and 3D.
4	Partial derivatives and Jacobian of transformations.
5	Maclaurin's series expansion.
6	Finding the solutions of first order ODEs and plotting the solution curve.
7	Solution of algebraic and transcendental equations by Newton Raphson method.
8	Convergence of infinite series: D-Alembert's ratio test, Raabe's test.
9	Solution of system of equations by employing Gauss-Siedel iteration.
10	Compute eigenvalues and eigenvectors.

Course Outcomes (Course Skill Set):

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

- **CO1-** Explain the basic concepts of calculus for a single and multivariable functions. Apply the concepts in their respective branches of engineering.
- **CO2-** Recall the basic definitions and methods of solving first order first degree ordinary differential equations. Discuss some methods of solving first order first degree ordinary differential equations with some applications of Engineering problems.
- **CO3-** Explain the basic concepts of double and triple integrals, beta and gamma functions and its applications to solve some Engineering problems.
- **CO4-** Describe the various concepts of infinite series, numerical methods and its applications to solve some Engineering problems.
- **CO5-** Recall the basic concepts of matrix theory and discuss the various methods of solving system of linear equations, eigen values and eigen vectors. Employing the linear algebra concepts in some Engineering contexts.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of IPCC:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment: One assignment (min.) or **Quiz** for an average of **10 Marks (after scale down).**

- Assignment or the quiz before the end of 3rd test of the semester for covering all COs.

The sum of average of three tests scale-down to **20 marks** and an assessment of **10 marks** will be the CIE marks for the theory component of IPCC for **30 marks**.

CIE for the practical component of IPCC:

- The split-up of CIE marks for record/ journal and test are in the ratio of **60:40.**
- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The**12 marks** are for conducting the experiment and preparation of the laboratory record, and the other **08 marks** shall be for a test to be conducted during the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups, continuous evaluations etc are added and scaled down to **12 marks**.
- The laboratory test **(duration 02/03 hours)** before the end of 15th week of the semester shall be conducted for 50 marks and scaled down to **08 marks.**

Scaled-down marks of write-up evaluations and tests added will be the CIE marks for the laboratory component of IPCC for **20 marks**.

The **final CIE** is the sum of CIE from Theory and the CIE from Practical/Laboratory, and is equal to **50 marks.**

SEE for IPCC:

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 main questions. Each main question is set for 20 marks.
- There will be 2 main 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 must answer 5 full main questions, selecting one full main question from each module.
- Marks scored shall be proportionally reduced to **50** marks.

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component.

- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 20% of each main question can be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks in a course.
- SEE will be conducted for 100 marks and students shall secure 40% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

Text Books

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, Latest edition, Wiley Publications.
2. B.S. Grewal, *Higher Engineering Mathematics*, Latest edition, Khanna Publishers.
3. Gilbert Strang, *Linear Algebra and its Applications*, Wellesley Publishers.
4. B.V. Ramana, *Higher Engineering Mathematics*, Latest edition, Tata McGraw Hill.

Reference Books:

1. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
2. N.P Bali and Manish Goyal: "A Textbook of Engineering Mathematics" (Volume I & II) Laxmi Publications, 10th Ed., 2019.
3. Gupta C.B, Singh S.R and Mukesh Kumar: "Engineering Mathematics for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.
4. H. K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.

Web links and Video Lectures (e-Resources):

- **http://nptel.ac.in/courses.php?disciplineID=111**
- **http://www.class-central.com/subject/math(MOOCs)**
- **http://academicearth.org/**

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

- **Quizzes**
- **Assignments**
- **Seminar**

Engineering Physics		Semester	I/II
Course Code	**BPHY102/202**	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	3	Exam Hours	3
Examination nature (SEE)	**Theory**/practical/Viva-Voce /Term-work/Others		

Course Objectives:

- To provide students with a strong foundational understanding of electromagnetic theory, elastic properties of materials and to introduce classical and quantum free electron theory related to the electrical behavior of materials and semiconductors.
- To build a conceptual framework for modern physics and quantum mechanics.
- To familiarize students with the principles and applications of lasers and optical fiber technology.
- To develop a solid understanding of materials science, including crystal structures and nanomaterials, and their real-world applications.

Teaching-Learning Process (General Instructions)

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

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Videodemonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

Module-1

Electromagnetism and Elastic properties of materials

Electromagnetism: Scalar and vector field, Gradient, divergence and curl. Coulomb's law, capacitance and dielectric materials. Biot Savart's law, Ampere's law, Magnetic field due to current carrying conductor. Maxwell's equations (qualitative), Electromagnetic waves (qualitative).

Elastic properties of materials: Concept of elasticity, stress, strain, types of stress and strain. Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus and Rigidity modulus (n) in terms of α and β. Relation between Y, n and K. Derivation of expression for bending moment of a beam with circular and rectangular cross section. Numerical problems.

Module-2

Electrical properties of materials

Free electron theory: 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, Fermi energy, Fermi factor and its temperature dependence, Merits of Quantum free electron theory. Numerical problems

Band theory of solids (Qualitative approach**),** Types of semiconductors, Expression for carrier concentration in Intrinsic semiconductors, Law of mass action, Variation of Fermi level in intrinsic and extrinsic semiconductors.

Module-3

Modern Physics & Quantum mechanics

Introduction to blackbody radiation spectrum: Wien's law, Rayleigh Jeans law, Stefan-Boltzmann law and Planck's law (qualitative), Deduction of Wien's law and Rayleigh Jean's law from Planck's law. Wave-particle dualism, de-Broglie hypothesis, de-Broglie wavelength. Numerical problems.

Quantum mechanics: Heisenberg's uncertainty principle, significance, and its applications: non-existence of electron inside the nucleus. Properties of wave function and physical significance. Probability density and Normalization of wave function, Schrodinger time independent wave equation in one-dimension, Eigen values and Eigen functions. Particle in one dimensional infinite potential well.

Module-4

Lasers and Optical fibers

Lasers: Introduction to Lasers, Einstein coefficient and its significance, population inversion, two, three and four level systems, pumping schemes, requisites of laser, construction and working of He-Ne and semiconductor lasers, applications of laser. Numerical problems.

Optical fibers- Construction and light propagation mechanism in optical fibers (total internal reflection), Expression for angle of acceptance and Numerical aperture. Types of optical fibers and modes of propagation. Attenuation (qualitative approach) . Numerical problems.

Module-5

Materials Science

Crystal Physics: Space lattice, unit cell, lattice parameters. Bravais lattice and crystal systems, Miller indices and expression for interplanar spacing in terms of Miller indices. Plane Sketches, Co-ordination number, Atomic packing factor for sc, bcc and fcc structures, X-ray diffractometer.

Nanoscience: Classification, properties and applications of nanomaterial's, Synthesis of nanomaterial - top down and bottom up approach (Ball milling and sol-gel method). Principle, construction, working and application of Scanning electron microscope (SEM), Transmission electron microscope (TEM).

Course Outcome (Course Skill Set)

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

1. Understand and apply fundamental concepts of **electromagnetism** and **elasticity** in engineering problems.
2. Analyze the **electrical properties of materials** using classical and quantum free electron theory, and apply band theory.
3. Explain the basics of **modern physics** and **quantum mechanics**, and solve related numerical problems.
4. Understanding the principles and working of **lasers and optical fibers** and their engineering applications.
5. Demonstration knowledge of **crystal physics and nanoscience**, including structure, properties, and synthesis.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The **final CIE** is the sum of average of three tests and two assessments, and is equal to **50 marks.**

Internal Assessment Test question paper is required to be designed to attain the different levels of Revised 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)**

- The question paper will have ten main questions. Each main question is set for 20 marks.
- There will be 2 main 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.

Suggested Learning Resources:

Text Books

1. **"Engineering Physics"** – *M.N. Avadhanulu and P.G. Kshirsagar*
2. Wiley precise Text, "**Engineering Physics**", Wiley India Private Ltd., New Delhi. Book series
3. Prof. S. P. Basavaraju, "**Engineering Physics**"

Reference Books:

1. **"Fundamentals of Physics"** – *David Halliday, Robert Resnick, and Jearl Walker*
2. **"Solid State Physics"** – *S.O. Pillai*
3. **"Concepts of Modern Physics"** – *Arthur Beiser*
4. **"Introduction to Quantum Mechanics"** – *David J. Griffiths*
5. **"Lasers and Non-Linear Optics"** – *B.B. Laud*
6. **"Introduction to Nanoscience and Nanotechnology"** – *K.K. Chattopadhyay and A.N. Banerjee*
7. **"Modern Physics"** – *Kenneth S. Krane*
8. **"Solid State Physics"** – *C. Kittel*

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/105105170/
- https://ocw.mit.edu/courses/physics/8-02-electromagnetism-spring-2002/
- https://nptel.ac.in/courses/113104067/
- https://ocw.mit.edu/courses/physics/8-04-quantum-physics-i-spring-2013/
- https://nptel.ac.in/courses/108106162/
- https://ocw.mit.edu/courses/physics/8-03sc-physics-iii-vibrations-and-waves-fall-2016/
- https://cosmolearning.org/courses/materials-science/video-lectures/

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

- Use a compass or magnetic sensors around a straight wire or loop to visualize field lines.
- Determine the rigidity modulus of a wire by measuring the time period of torsional oscillations.
- Create a visual concept map comparing classical and quantum free electron theories.
- Students discuss in groups how Planck's law bridges classical and quantum physics.
- Groups propose a working model of a three-level laser with labeled components.
- Use transparent water tubes or gelatin to demonstrate light propagation via total internal reflection.

Basic Electrical Engineering		Semester	**I/II**
Course Code	**BELE103/203**	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	3	Exam Hours	3
Examination nature (SEE)	**Theory**		

Course Objectives:

- To explain the laws used in the analysis of DC and AC circuits.
- To explain the behaviour of circuit elements in single-phase circuits.
- To explain the generation of three-phase power and operation of three-phase circuits.
- To explain the construction and operation of transformers, DC generators and motors, induction motor, and synchronous generators.
- To explain electric transmission and distribution, electricity billing and, equipment, and personal safety measures.

Teaching-Learning Process (General Instructions)

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

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Videodemonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

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.

AC Fundamentals: Generation of sinusoidal voltage, frequency of generated voltage, average value, root mean square value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities.

Module-2

Single Phase Circuits: Analysis of circuits with R, L, C, R-L, R-C, (R-L-C for series and parallel configurations with phasor diagram: self-study), Real power, reactive power, apparent power and power factor.

Three Phase circuits: Generation of 3-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 3-phase power, voltage and current relations in star and delta connections.

Module-3

Electrical Machines: Constructional features, Operation and applications: Single and three phase induction motors, universal motor.

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.

Module-4

Renewable and Non-Renewable Energy Resources: Sources of energy-Power generation: thermal and hydel.

Advantages of Renewable Energy Sources: Tidal, biomass, geothermal and wind.

Power generation: Solar and Wind, electrical characteristic of PV Cell.

Module-5

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).

Course Outcome (Course Skill Set)

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

1. Explain the behaviour of AC and DC circuits.
2. Understand the generation and operation of single phase and three-phase circuits.
3. Analyze the construction and operation of Electrical Machines.
4. Illustrate the working principle of both renewable and non-renewable power generating plant.
5. Understand the tariff, electricity billing and protection devices.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The **final CIE** is the sum of average of three tests and two assessments, and is equal to **50 marks.**

Internal Assessment Test question paper is required to be designed to attain the different levels of Revised 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)**

- The question paper will have ten main questions. Each main question is set for 20 marks.
- There will be 2 main 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 must answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to **50** marks

Suggested Learning Resources:

Text Books

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

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.

Web links and Video Lectures (e-Resources):

- . www.nptel.ac.in

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

- Identify errors in a faulty circuit diagram
- Understand the function of electrical components.
- Compare alternating and direct currents.
- Visualize how Ohm's Law connects with resistance, voltage, current, and power.

Elements of Civil Engineering		Semester	I/II
Course Code	**BCIV104/BCIV204**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	3-0-0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3
Examination nature (SEE)	**Theory**/practical/Viva-Voce /Term-work/Others		

Course Objectives:

- To acquire insights on various fields of civil engineering.
- To develop student's ability to analyze the problems involving forces, moments with their applications.
- To make students to learn the effect of friction on different planes.
- To develop the student's ability to find out the centre of gravity and moment of inertia and their applications.

Teaching-Learning Process (General Instructions)

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

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Videodemonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

Module-1

Introduction: Definition of Civil Engineering, Scope of different fields of Civil Engineering; Building Materials, Surveying, Geotechnical Engineering, Structural Engineering, Construction Technology, Hydraulics, Water Resources & Irrigation Engineering, Transportation Engineering and Environmental Engineering.

Role of Civil Engineers in the Infrastructural development, effect of infrastructural facilities on social-economic development of a country.

Types of Bridges, types of Dams.

Module-2

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

Module-3

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

Module-4

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

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

Module-5

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

Course Outcome (Course Skill Set)

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

1. Discuss the applications of the various fields of civil Engineering.
2. Compute the resultant of a force system and resolution of a force.
3. Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces.
4. Analyse the frictional resistance offered by different planes.
5. Locate the centroid and compute the moment of inertia of sections.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The **final CIE** is the sum of average of three tests and two assessments, and is equal to **50 marks.**

Internal Assessment Test question paper is required to be designed to attain the different levels of Revised 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)**

- The question paper will have ten main questions. Each main question is set for 20 marks.
- There will be 2 main 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 must answer 5 full questions, selecting one full question from each module
- Marks scored shall be proportionally reduced to **50** marks

Suggested Learning Resources:

Text Books

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB.
3. Nelson A, Engineering Mechanics – Statics & Dynamics, 2015, Mc Graw Hill Education.

Reference Books:

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

Web links and Video Lectures (e-Resources):

https://youtu.be/LjtsF5ofWOU?feature=shared
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=ljDIIMvxeg&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

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

Computer Aided Engineering Drawing		Semester	I / II
Course Code	**BCED105/205**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	2-0-2-0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3
Examination nature (SEE)	**Practical**		

Course Objectives:

- To enable students to draw precise shapes and dimensions using CAD software.
- To impart knowledge of engineering drawing through first angle projection using points and lines.
- To train students in creating orthographic projections of solids in various spatial orientations.
- To develop the ability to generate surface and lateral developments of 3D objects.
- To equip students with skills to interpret isometric views and convert them into orthographic projections.

Teaching-Learning Process (General Instructions)

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

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Videodemonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

Module-1

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 (***The above topic shall not be asked for SEE***).

Orthographic Projections of Points, Lines and Planes:

Introduction to Orthographic projections: Orthographic projections of points in 1st and 3rd 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 using change of position method).

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

Module-2

Orthographic Projection of Solids: Orthographic projection of right regular solids using First Angle Projections only: Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes, Hexahedron and Tetrahedron.

Projections of Frustum of cone and pyramids (For practice only, not for CIE and SEE).

Module-3

Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones. 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.

Module-4

Development of Regular Surfaces:
Development of lateral surfaces of right regular prisms, pyramids, cylinders, and cones resting on HP only.
Development of Lateral Surfaces of of their frustums and truncations.
Problems on applications of development of lateral surfaces like funnels and trays.

Module-5

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, practice on layers concept.
Graphs & Charts: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.

Course Outcome (Course Skill Set)

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

CO1. Draw and Interact with CAD software's with definite shape and dimensions

CO2. Explain the concept of Engineering drawing in First angle projections using Points, lines and planes.

CO3. Creating Orthographic Projection of Solids in different positions

CO4. Develop the different surfaces and lateral surfaces of the object.

CO5. Draw and communicate the Isometric graphical representation and converting it into Orthographic Projections.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE):

- CIE shall be evaluated for max. marks of 100 and later the same shall be scaled-down to 50 marks as detailed below:
- CIE component should comprise of Continuous evaluation of Drawing work of students as and when the Modules are covered based on below detailed weightage or any scheme can be adopted to give due weightage.

Module	Max. Marks Weightage	Evaluation Weightage in marks	
		Computer display and print out (a)	Sketching (b)
Module 1	25	15	10
Module 2	25	15	10
Module 3	20	20	00
Module 4	20	20	00
Module 5	10	05	05
Total	**100**	**75**	**25**
Consideration of Class work		**Total of [(a) + (b)] = 100** **Scaled down to 30 Marks**	

- At least one **Test** covering all the modules is to be conducted for 100 marks and evaluation to be based SEE pattern, and the same is to be scaled down to **20Mark**s.
- The final CIE = Class work marks (**30**) + Test marks (**20**) = **50** Marks

Semester End Examination (SEE):

- SEE shall be conducted and evaluated for maximum marks of 100. Marks obtained shall be accounted for SEE final marks, will be scale-down to 50 marks.
- 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.*
- In Module-1, the choice between points and lines & Planes, and similarly, the choice between the Module-3 and Module-4. However, there is no choice for the Module-2. One full question shall be set from each of the Module from Modules 1,2,3 and 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	Particulars	Max. Marks Weightage	Evaluation Weightage in marks	
			Computer display and print out (a)	Preparatory sketching (b)
Module-1	**Points & Lines**	25	15	10
	OR			
	Planes	25	15	10
Module-2	**Solids**	45	25	15
Module-3	**Isometric**	30	20	10
OR				
Module-4	**Development**	30	20	10
	Total	**100**	**80**	**20**
Consideration of SEE Marks			**Total of [(a) + (b)] ÷ 2 = Final SEE marks**	

Suggested Learning Resources:

Text Books

1. *K. R. Gopalakrishna, & Sudhir Gopalakrishna*: Textbook of Computer Aided Engineering Drawing,

39thEdition, Subash Stores, Bangalore,2017

2. *Engineering Drawing: by N.D. Bhatt*, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.

Reference Books:

1. *Computer Aided Engineering Drawing* (Revised 3rd Edition) by S. Trymbaka Murthy, I.K. International Publishing House
2. **K. Venugopal & V. Prabhu Raja** – *Engineering Graphics (As per Anna University)*, New Age International.
3. Question Bank with solutions on Computer Aided Engineering Drawing for I/II semester, VTU, Belgaum.
4. *Dr. Nithin S K*: Engineering Graphics, 1st Edition, Archers and Elevators Publishing House, Bengaluru, 2020

Web links and Video Lectures (e-Resources):

https://www.autodesk.com/products/autocad/overview
https://www.youtube.com/watch?v=jDM6dnhMowY
https://www.coursera.org/courses?query=cad
https://www.youtube.com/results?search_query=CAD+tutorials

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

- Ask students to bring a small object (e.g., a pen, a mobile stand, or a nut-bolt assembly) and model it using CAD software.
- Provide orthographic views and ask students to convert them into isometric drawings using CAD, and vice versa.
- Assign students a drawing task where they must use multiple layers (for centerlines, dimensions, objects, etc.) with proper naming and color coding.
- Provide 2D sketches and ask students to extrude, revolve, or loft to create 3D models.
- Assign a mini project to design and assemble a mechanical component (e.g., piston-cylinder, bracket joint) using CAD software.

Engineering Physics Laboratory		**Semester**	**I/II**
Course Code	**BPHYL106/206**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0-0-2-0	SEE Marks	50
Total Hours of Pedagogy	25 Hrs	Total Marks	100
Credits	01	Exam Hours	03
Examination nature (SEE)	Theory/**Practical**/Viva-Voce /Term-work/Others		

Course Objectives:

- To develop practical skills in measuring mechanical properties and understanding the behavior of electrical and electronic devices through hands-on experiments.
- To explore thermal and quantum phenomena and applying the principles of wave optics.
- Enhancing skills in experimental data analysis, interpretation, and scientific reporting.

Sl.NO	**Experiments**
1	**Spring Constant-** To determine the spring constants of the given springs.
2	**Dielectric constant**- Determination of dielectric constant of the given dielectric material by charging and discharging.
3	**Zener diode-** I-V characteristics of Zener diode.
4	**Young's Modulus:** Determination of Young's Modulus of the given material.
5	**Planck's constant-** Determination of the Planck's constant using light emitting diodes.
6	**Stefan's law**- Verification of Stefan's law.
7	**Fermi Energy-** Determination of Fermi energy of given material.
8	**Band gap-** Determination of energy gap of a given semiconductor.
9	**Laser diffraction-** Determination of wavelength of given laser.
10	**Torsional Pendulum-** Determination of moment of inertia of the given irregular body

Course Outcomes (Course Skill Set):

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

1. Apply fundamental principles of mechanics and material science by experimentally determining properties such as spring constant, Young's modulus, and moment of inertia of given materials and bodies.
2. Understanding and analysing electrical and electronic components and devices through practical investigations of dielectric constants, Zener diode characteristics, and Planck's constant using LEDs.
3. Investigate and analysing thermal radiation and quantum properties of materials by experimentally verifying Stefan's law, determining Fermi energy, and measuring the semiconductor band gap.
4. Employ wave optics principles to determine the wavelength of light using laser diffraction and understand the practical applications of optical phenomena.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum 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 of **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, 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.
- 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 final CIE marks scored by the student, and is equal to **50 marks**.

Semester End Evaluation (SEE):

- SEE marks for the practical course is **50** Marks.
- SEE shall be conducted jointly by the two 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 examiners.
- Students can pick question(s) (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)
- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part to be made zero.
- The duration of SEE is **03** hours.

Suggested Learning Resources:

- **A Textbook of Practical Physics** — I. Prakash and Ramakrishna
- **Experiments in Applied Physics** — D. P. Khandelwal
- **Introduction to Solid State Physics** — Charles Kittel
- **Optics** — Ajoy Ghatak
- http://hyperphysics.phy-astr.gsu.edu
- https://nptel.ac.in/
- https://phet.colorado.edu

Basic Electrical and Electronics Engineering Laboratory		**Semester**	**I/II**
Course Code	**BELEL107/207**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0-0-2-0	SEE Marks	50
Total Hours of Pedagogy	25 Hrs	Total Marks	100
Credits	01	Exam Hours	03
Examination nature (SEE)	**Practical**		

Course Objectives:

- Explain how to verify KCL and KVL for DC circuit.
- Explain power and power factor measurement of different types of lamps.
- Explain the measurement of power consumed in a 3-phase load.
- Explain methods of controlling a lamp from different places.
- Explain the truth table for logic gates.
- Explain the working principle of diode, MOSFET.
- Explain the operation of diode rectifier.

Sl.N	**Experiments**
	Part-A
1	Verification of KVL and KCL for DC circuits
2	Measurement of resistance and inductance of a choke coil using three voltmeter method
3	Two-Way and Three-Way control of lamp.
4	Measurement of Current, Power and Power Factor of Incandescent Lamp, Fluorescent Lamp and LED Lamp.
5	Determination of Electrical Characteristic of Photovoltaic cells.
	Part-B
6	Obtain the V-I Characteristics of a Diode.
7	Zener diode as a Voltage Regulator with variable load.
8	Design and verify the truth table of logic gates
9	Calculate the efficiency of Half Wave and Full Wave diode rectifier.
10	Obtain the characteristic of MOSFET.

Course Outcomes (Course Skill Set):

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

- To conduct experiment to verify KVL and KCL.
- To conduct experiment to measure impedance of a choke coil & power factor of different lamps.
- To understand the working of two-way and three-way control of lamp.
- To obtain the characteristic of Diode, Zener diode, MOSFET & PV Cell.
- To verify the truth table of Logic gates
- To compute the efficiency of half wave and full wave diode rectifier

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE.

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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum 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 of **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.
- 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 final CIE marks scored by the student, and is equal to **50 marks**.

Semester End Evaluation (SEE):

- SEE marks for the practical course is **50** Marks.
- SEE shall be conducted jointly by the two 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 examiners.
- Students can pick question(s) (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)
- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part to be made zero.
- The duration of SEE is **03** hours.

Suggested Learning Resources:

- "Electrical Technology" by B.L. Theraja – AC circuits and three-voltmeter method
- Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.

I Semester - BE

Communicative English		Semester	I
Course Code	**BEGH108**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1-0-0	SEE Marks	--
Total Hours of Pedagogy	15 Hrs	Total Marks	50
Credits	01	Exam Hours	--
Examination nature (SEE)	**No SEE**		

Course Objectives:

The course will enable the students,

- To know about Fundamentals of Communicative English and Communication Skills in general.
- To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better communication skills.
- To impart basic English grammar and essentials of important language skills.
- To enhance 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 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.

Module-2

Introduction to Phonetics :
Introduction, Phonetic Transcription, English Pronunciation, Pronunciation Guidelines Related to consonants and vowels, Sounds Mispronounced, Silent and Non-silent Letters, 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.

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.

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.

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.

Course Outcome (Course Skill Set)

At the end of the course, 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. Impart basic English grammar and essentials of language skills as per present requirement.
4. Understand and use all types of English vocabulary and language proficiency.
5. Adopt the Techniques of Information Transfer through presentation.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 30 questions) each of 30 Marks (duration 01 hour)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of 10 Marks (after scale down).

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for 10 Marks (duration 01 hours)

The sum of average marks of three tests and two assessments will be the final CIE, and shall be equal to 50 marks.

Semester End Examinations (SEE)

- **No SEE** for a course of 01 credit of theory type.

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/II Semester

INNOVATION and DESIGN THINKING		Semester	I/II
Course Code	**BIDT109/209**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	--
Total Hours of Pedagogy	15	Total Marks	50
Credits	01	Exam Hours	--
Examination nature (SEE)	**No SEE**		

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

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

Module-3

Design Thinking in IT

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

Module-5

Design thinking workshop

Design Thinking Workshop Empathize, Design, Ideate, Prototype and Test

Course Outcomes:

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

CO1: Appreciate various design process procedure

CO2: Generate and develop design ideas through different technique

CO3: Identify the significance of reverse Engineering to understand products

CO4: Draw technical drawing for design ideas

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 30 questions) each of **30 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The sum of average marks of three tests and two assessments will be the final CIE, and shall be equal to **50 marks.**

Semester End Examinations (SEE)

No SEE for a course of 01 credit of theory type.

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:

1. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", CengageLearning, Second Edition, 2011.
2. 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
9. https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf
10. https://dschool.stanford.edu/use-our-methods/
11. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
12. http://www.creativityatwork.com/design-thinking-strategy-for-innovation/ 49
13. https://www.nngroup.com/articles/design-thinking/
14. https://designthinkingforeducators.com/design-thinking/
15. www.designthinkingformobility.org/wp-content/.../

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

1. http://dschool.stanford.edu/dgift/
2. https://onlinecourses.nptel.ac.in/noc19_mg60/preview

Engineering Chemistry		Semester	I/II
Course Code	**BCHE102/BCHE202**	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	3	Exam Hours	3
Examination nature (SEE)	**Theory**		

Course Objectives:

- To attain knowledge about desalination of brackish water and treatment of municipal water.
- To gain the knowledge of conducting polymers, bio-degradable polymers and fibre reinforced plastics.
- To learn significance of analytical sensors and energy sources and the synthesis of Nano materials.
- To understand mechanism of corrosion and preventive methods.
- Understanding the unique properties, identifying diverse applications, and developing new, sustainable polymer materials.

Teaching-Learning Process (General Instructions)

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

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Videodemonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

Module-1

ELECTROCHEMISTRY

Electrode systems: Introduction, Single electrode potential-origin, terminology, measurement and its applications. Nernst Equation - applications and numerical. Standard Electrode Potential and its applications. Types of electrodes- reference electrodes-calomel and Ag/AgCl electrodes.

Electromotive force: EMF of a galvanic cell, construction, and its conventional representation**.** Concentration cells – Types, Applications of EMF measurements.

Electrochemical Energy Systems: Introduction, battery characteristics, Classification of batteries-primary, secondary and reserve batteries with examples. Construction, working and applications of dry cells, Nickel- metal hydride, lead storage, Nickel-Cd, lithium-MnO_2 and Li- ion batteries.

Self-Study Components: Determination of pH using Glass Electrode; Ion Selective Electrode - Principle, construction and applications.

Module-2

CORROSION AND ELECTROLYSIS

Corrosion: Introduction, electrochemical theory of corrosion, galvanic series. Factors affecting the rate of corrosion - ratio of anodic to cathodic areas, nature of metal, nature of corrosion product, nature of medium – pH, conductivity and temperature.

Types of corrosion: Differential metal, differential aeration (Pitting and water line) and stress.

Corrosion control: Inorganic coatings - Anodizing of Al and Phosphating, Metal Coatings - Galvanization and Tinning. Cathodic protection (sacrificial anodic and impressed current methods).

Electroplating: Introduction, Technological importance. Principles governing polarization, decomposition potential and overvoltage. Factors influencing the nature of electro deposit- current density, concentration of metal ion, electrolyte, pH, temperature and throwing power of plating bath. Additives - brighteners, levellers, structure modifiers and wetting agents. Electroplating of Chromium (decorative and hard).

Self-Study Components: **Electroless plating:** Introduction, distinction between electroplating and electro less plating, electro less plating of copper and manufacture of double-sided Printed Circuit Board with copper.

Module-3

ANALYTICAL TECHNIQUES AND ENERGY SOURCES

Potentiometric sensors: Definition, Principle, Instrumentation, working and its application in the estimation of iron.

Conductometric sensors: Definition, Principle, Instrumentation, working and its application in the estimation of acid mixtures. (strong acid v/s strong base, weak acid v/s strong base).

Optical sensors: Definition, Principle, Instrumentation, working of colorimetry and its application in the estimation of Iron (III) and Cu(II).

pH sensors: Definition, Principle, Instrumentation and working of glass electrode and its application in the determination of soil sample.

Solar Energy: Introduction, utilization and conversion, photovoltaic cells (PV) - construction and working.

Design of PV cells: modules, panels and arrays. Advantages and disadvantages of PV cells.

Self-Study Components: **Production of solar grade silicon**: Union carbide process, purification of silicon (zone refining), doping of silicon- diffusion technique (n- and p-types). Construction and working of energy storage super capacitors.

Module-4

WATER TECHNOLOGY AND FUNCTIONAL MATERIALS

Introduction**,** Boilers and Boiler Troubles, Determination of hardness, DO, BOD, COD and numericals.

Sewage treatment: Primary, secondary (activated sludge method) and tertiary methods. Softening of water by ion- exchange process. Desalination of sea water by reverse osmosis and electro dialysis (ion selective)

Nanotechnology:

Introduction, definition, classification, size dependent properties of nanomaterials (Surface area, catalytic), synthesis of nanomaterials by sol-gel and hydrothermal methods, Properties and Engineering applications of Carbon nanotubes (CNT and MWCNT), Graphene.

Metal oxide nanomaterials (ZnO/TiO_2): Properties and applications in the photo catalytic degradation of industrial effluents.

Self-Study Components: Public Health Significance of heavy metal ions, fluoride, nitrate and detergents.

Module-5

POLYMER AND ITS APPLICATIONS

Polymers: Introduction, Classification of polymers based on source, structure, and mode of polymerization; properties of polymers, addition and condensation polymerization, Mechanism of polymerization (cationic, anionic and free radical mechanisms). Plastics, elastomers and fibres. Vulcanization of rubber; Molecular weight of polymers: Number average, weight average molecular weight of polymers and numericals. Determination of molecular weight of polymers – Viscosity and light scattering methods. Synthesis, properties and applications of Buna-S, silicone and butyl rubber. Polymer composites (Carbon fibre and Kevlar).

Self-Study Components: **Types of organic memory devices:** Organic molecules (p-type semiconductor – ex: Pentacene, n-type ex: Perfluoropentacene used as memory materials).

Course Outcome (Course Skill Set)

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

- Explain the basic concept of electrochemistry, batteries and their applications.
- Develop the knowledge in corrosion science and also to control corrosion problems.
- Understand different analytical techniques using sensors and energy sources.
- Determine the contaminants in the water samples by suitable analytical procedures and understanding the applications of functional materials.
- Explain the applications of polymers.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The **final CIE** is the sum of average of three tests and two assessments, and is equal to **50 marks.**

Internal Assessment Test question paper is required to be designed to attain the different levels of Revised 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)**

- The question paper will have ten main questions. Each main question is set for 20 marks.
- There will be 2 main 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.

Suggested Learning Resources:

Text Books

1. Essentials of Engineering Chemistry, S. K. Bhasin and Vijay Sharma, Himalaya Publishing House (2010).
2. Engineering Chemistry: Fundamentals and Applications, Shikha Agarwal, Cambridge University Press (2015).
3. Engineering Chemistry, R. Mukhopadhyay and Sriparna Datta, New Age International Ltd (2007).
4. Engineering Chemistry, V. Srinivasan, S. Rekha and K. Sudhakar, Pearson Ltd (2017).
5. Nanomaterials and Nanocomposites: Synthesis, Properties, Characterization Techniques and Applications, Rajendra Kumar Goyal, CRC Press, Taylor and Francis (2018).

Reference Books:

1. Fundamentals of Corrosion: Mechanisms, Causes and Preventive Methods, Philip A. Schweitzer, CRC Press (2010).
2. Applied Chemistry- A Textbook for Engineers and Technologists, 2nd Edition, O.V. Roussak and H.D. Gesser, Springer (2013).
3. Introduction to Polymer Chemistry, 3rd Edition, Charles E. Carraher, Jr. CRC Press (2013).
4. Fundamentals of Electrochemistry, Second Edition, V. S. Bagotsky, Wiley Inter science (2006).

C Programming for Problem Solving		Semester	I/II
Course Code	**BCPS103/BCPS203**	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
Examination nature (SEE)	**Theory**		

Course Objectives:

- To develop foundational problem-solving skills by introducing algorithmic thinking, flowcharts, and pseudo code, enabling students to translate solutions into structured C programs.
- To impart knowledge of C programming constructs including data types, operators, control statements, arrays, functions, and recursion for solving computational problems.
- To enable students to write efficient and modular code using concepts such as pointers, dynamic memory allocation, structures, unions, and file handling for real-world applications.
- To enhance logical reasoning and analytical skills through the implementation of searching and sorting algorithms and understanding program structure, syntax, and debugging techniques.

Teaching-Learning Process (General Instructions):

These are strategies that instructors can adopt to accelerate the attainment of various outcomes:

- Utilize diverse instructional tools such as interactive PowerPoint presentations, video demonstrations, simulations, and Chalk & Talk methods to explain core C programming concepts including flowcharts, algorithms, memory allocation, and code structure.
- Adopt innovative teaching methods like the flipped classroom model—sharing pre-lecture materials and using class time for coding practice, discussions, and clarification—combined with regular hands-on coding sessions and lab exercises for experiential learning.
- Promote collaborative and peer-based learning by encouraging group activities such as pair programming, debugging tasks, and mini projects to strengthen logical reasoning and teamwork.
- Incorporate active learning strategies like Problem-Based Learning (PBL), online coding quizzes, and coding competitions or hackathons to develop critical thinking, problem-solving, and application-oriented programming skills.

Module-1

Introduction to Problem Solving: Problem definition, Algorithmic Thinking, Algorithm, Flowchart, concept of Pseudo Code with Examples, From Algorithms to Programs, Structure of C Program, Compiler, Syntax and Logical Errors in Compilation, Object code and Executable Code, Standard I/O in C, Fundamental Data types, Identifiers, Variables, Tokens, Keywords, and Storage Classes in C.

Module-2

Operators and Expressions: Operators and Expressions, Arithmetic and Relational Operators, Mixed Operands, implicit and explicit type Conversion, Logical Operators, Bit-wise Operators, Assignment Operator, Operator Precedence and Associativity.

Conditional Statements: if, if-else and else-if ladder, nested if-else statement, ternary operator,

Module-3

Loops: Introduction, while, do-while and for loops, nested loops, Multiple Loop Variables, Break, Continue and goto statements.

Arrays: Introduction, Notations for One-Dimensional and Multi-Dimensional arrays, Array Operations, Strings.

Module-4

Functions: Introduction to Function, Types of Functions, and String functions. Passing Parameters to Functions, Call by Value, Call by Reference, Recursions.

Searching and Sorting: linear search, binary search, Bubble Sort, Insertion and Selection Sort.

Module-5

Pointers: Introduction, Dynamic Memory Allocation (malloc, calloc, realloc, free), types of pointers, structures and unions.

File Handling: File I/O Functions, Standard C Preprocessors, programs based on file handling.

Course Outcome (Course Skill Set)

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

CO 1	Explain fundamental concepts of problem-solving using flowcharts, algorithms, and pseudo code, and apply these to develop basic C programs with proper syntax and structure.
CO 2	Analyze various C operators and decision-making constructs to implement logic-based solutions for real-world problems.
CO 3	Develop C programs using iterative constructs, arrays, and string operations to solve computational problems efficiently.
CO 4	Apply modular programming techniques using functions and recursion, and analyze search and sort algorithms for efficient problem solving.
CO 5	Demonstrate effective use of pointers, dynamic memory, structures, and file handling in C to develop robust programs for data processing and management.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The **final CIE** is the sum of average of three tests and two assessments, and is equal to **50 marks.**

Internal Assessment Test question paper is required to be designed to attain the different levels of Revised 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)**

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

- There will be 2 main 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 must answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to **50** marks

Suggested Learning Resources:

Text Books

1. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill.
2. The C programming by K Rernighan Brain W. and Ritchie Dennis M., Pearson Education.

Reference Books:

1. Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson Addison- Wesley, 2006.
2. Let Us C By Yashwant P. Kanetkar.
3. Expert C Programming by Peter van der Linden,Pearson.

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/106/105/106105171/
2. https://archive.nptel.ac.in/courses/106/104/106104128/
3. https://www.mooc-list.com/tags/c-programming
4. https://www.coursera.org/courses?query=c%20programming.

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

- **Flowchart-to-Code Exercises:**
  Students create flowcharts or pseudo code for a given problem and then implement the solution in C.
- **Debugging Challenges:**
  Provide faulty C programs for students to identify and correct syntax and logical errors.
- **Mini Projects:**
  Assign small tasks like developing a calculator, student record system, or sorting application using arrays and file handling.
- **Live Coding Sessions:**
  Conduct in-class coding exercises on topics like loops, functions, or pointers to enhance hands-on programming skills.

Basic Electronics & Communication Engineering		Semester	I/II
Course Code	**BELN104/204**	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	3	Exam Hours	3
Examination nature (SEE)	**Theory**		

Course Objectives: Students will be taught

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

Teaching-Learning Process (General Instructions): These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Videodemonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

Module-1

Semiconductor Diode and its Applications: Introduction to semiconductors, Construction, working, and characteristics of PN-junction Diode, Diode approximations, Shockley's Equation. (Numerical)

Diode Application: Half-wave, Full-wave, and Bridge Rectifiers, Mention of expression for average, RMS, and Peak Inverse Voltage, and Ripple Factor to each configuration. (Numerical)

Zener Diode: Zener Diode and its Characteristics, Zener diode voltage regulator, parameters of Zener diode. (Numerical)

Module-2

Transistor: Introduction to BJT voltage and current**,** Construction and working of Bipolar Junction Transistor, Transistor voltages and currents, mention of CB, CE and CC configurations, Input and Output characteristics of CE configuration, Circuit diagram and working of Transistor as Switch and Amplifier. (Numerical)

Field Effect Transistors: Construction and working of JFET, Common Drain and Transfer Characteristics of JFET. (Numerical)

MOSFET: Introduction to MOSFET Construction, working and Characteristics of Depletion and Enhancement mode MOSFET

Module-3

Basics of Digital Electronics: Analog verses Digital Signals, Decimal, Binary, Octal and Hexadecimal Numbers and interconversion among them, 2's complement Arithmetic, Addition and Subtraction of Binary Numbers, Basic and Universal Gates, design derived gates and basic gates using Universal gates and De-morgan's Theorem.

Combinational Logic Circuits: Boolean Algebra and Theorems, Simplification of Logic Circuits, Full-adder and Half-adder.

Module-4

Operational Amplifiers and its Applications: Basics of Differential Ampler, Block diagram of Op-amp and its modes, Ideal verses Practical Op-amps, Open and Closed Loop Op- amp configurations.

Op-amp Parameters: Definition and expression for Voltage gain, CMRR, Input Offset Voltage and Current, Input Bias Current, Virtual Ground, Input and Output impedance, Slew rate. Inverting amplifier and non-inverting amplifier (Numerical)

Module-5

Basics of Electronic Communication: Definition of Modulation and Demodulation, Need for Modulation, Electromagnetic Frequency Spectrum.

Analog Communication: Block Diagram of Analog Communication System, Principles of AM and FM Modulation Schemes and their Comparison.

Digital Communication: Block Diagram of Digital Modulation System, Advantages of Digital Communication over Analog Communication.

Course Outcome (Course Skill Set)

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

- Explain the characteristics of basic electronic devices
- Understand the importance of electronic devices
- Apply the principles of working of electronic devices to design the electronic circuits
- Illustrate the importance of Electronic Communication System
- Understand the fundamental knowledge on the operation of Mobile Telephones

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The **final CIE** is the sum of average of three tests and two assessments, and is equal to **50 marks.**

Internal Assessment Test question paper is required to be designed to attain the different levels of Revised 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)**

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

- There will be 2 main 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 must answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to **50** marks

Suggested Learning Resources:

Text Books

1. David A. Bell, "Electronic Devices and Circuits," 5th Edition, Oxford University Press, 2015.
2. Ramakanth A Gayakwad, "Op-Amps and Linear ICs," Pearson Education, 4th Edition, 2015.

Reference Books:

1. Robert L Boylestad and Louis Nashelsky, "Electronic Devices & Circuit Theory," 11th Edition, Pearson Education India, 2018.
2. David A. Bell, "Operational Amplifiers and Linear ICs," 3rd Edition, Oxford University Press, 2011.

Web links and Video Lectures (e-Resources):

1. https://www.elsevier.com/books/basic-electronics/holbrook/978-0-08-006865-7
2. http://nptel.ac.in/courses/117103063/
3. https://nptel.ac.in/courses/117/105/117105143/
4. https://swayam.gov.in/
5. https://www.mooc-list.com/course/introduction-electronics-coursera

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

- Recognize and understand basic electronic components.
- Demonstrate the relationship between voltage, current, and resistance.
- Understand series vs. parallel connections.
- Understand basic logic gates (AND, OR, NOT).

Elements of Mechanical Engineering		Semester	I/II
Course Code	**BEME105/205**	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	3	Exam Hours	3
Examination nature (SEE)	**Theory**		

Course Objectives:

- To provide students with knowledge of various conventional and renewable energy sources and their applications in sustainable energy systems.
- To enable students to understand the working principles, types, and performance characteristics of steam, gas, and hydraulic turbines.
- To impart foundational knowledge of refrigeration and air conditioning systems along with mechanical and electrical power transmission techniques.
- To familiarize students with the operation of machine tools and various metal joining processes used in manufacturing and fabrication.
- To introduce students to automation and robotics systems and the selection and application of engineering materials in industrial processes.

Teaching-Learning Process (General Instructions)

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

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Videodemonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

Module-1

Energy Sources: Sources and Classification of Energy Resources. Non-renewable and renewable energy resources, Brief Description and Utilization of Solar Energy, Wind Energy, Ocean Thermal Energy Conversion (OTEC), Tidal Energy and Nuclear Energy.

Steam: Steam Formation, Properties of Steam and applications of steam (simple numerical on steam properties using steam tables), Boilers- Definitions, Classification, Working Principles of Babcock and Wilcox boiler,

Module-2

Gas Turbines – Definitions, Classification, Working Principles and Operations of Open Cycle and Closed Cycle Gas Turbines.

Hydraulic Turbines – Definitions, Classification, Principles and Working of Pelton wheel, Francis turbine and Kaplan Turbine.

Internal Combustion Engines: Definitions Classification, Two Petrol and Four Stroke Petrol and Diesel Engines. P-V Diagrams of Otto and Diesel Cycles. Comparison of Petrol and Diesel Engines. Comparison of two and Four Stroke Engines.

Pump: Definitions, Comparison, Working Principle and Operation of Centrifugal Pump and Reciprocating Pump.

Module-3

Refrigeration Air Conditioning: Refrigeration – Definitions, Refrigerant, refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Unit of Refrigeration, Properties of refrigerants, List of commonly used refrigerants. Working Principles of Vapour Compression and Vapor Absorption Refrigeration system.

Definitions of AC, Working Principles Split AC.

Power Transmission: Belt Drives – Open and Cross Belt drives, Definition-slip, creep, velocity ratio, Derivation of length of the belt in open and crossed belt drive, Ratio of tensions in belt drives. Simple numerical on belt drives.

Gear Drives – Types of gears, velocity ratio, advantages, disadvantages, and applications of Gear Drives. Simple numerical on gear drives.

Module-4

Machine Tools: Definitions, **Lathe**: Working Principle and Operation of lathe, Main parts of an engine lathe, Operations on lathe: Turning, facing, knurling, thread cutting, taper turning and drilling.

Drilling Machine: Definitions, Working Principle, Operations of drilling machines, Operations on Drilling: Drilling, Reaming, Boring, Counter sinking, Counter boring, Tapping,

Milling Machine: Definitions, Working Principle of Horizontal Milling Machine, Type of Milling: Up Milling and Down Milling.

Metal Joining Processes: Definitions of Welding, soldering and Brazing, Working Principles of Arc Welding and Gas Welding Machine. Working Principles and applications of Soldering and Brazing.

Module-5

Automation and Robotics: Automation: Definitions, components of NC and CNC, Advantages and disadvantages of NC and CNC.

Robotics: Definitions Robot anatomy, Robots configuration- Polar, cylindrical, Cartesian coordinate and spherical. Applications, Advantages, and disadvantages.

Engineering Materials: Properties, Composition, and Industrial Applications of engineering materials

Metals – Ferrous: cast iron, tool steels and stainless steels and **Non-ferrous:** aluminum, brass, bronze.

Course Outcome (Course Skill Set)

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

a. Identify different sources of energy and their conversion process
b. Explain the working principle of hydraulic turbines, IC engines, pumps.
c. Understand Refrigeration and Air conditioning system and power transmission elements.
d. Discuss the working of conventional machine tools, machining operations etc.
e. Describe the advanced manufacturing systems and the properties of common engineering materials and their applications in engineering industry.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The **final CIE** is the sum of average of three tests and two assessments, and is equal to **50 marks.** **Internal Assessment Test question paper is required to be designed to attain the different levels of Revised 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)**

- The question paper will have ten main questions. Each main question is set for 20 marks.
- There will be 2 main 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 must answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to **50** marks

Suggested Learning Resources:

Text Books

1) Gopalakrishna, K.R., *Elements of Mechanical Engineering*, Subhas Stores, Bangalore, Latest Edition.
2) Dr. Nithin S K, *Elements of Mechanical Engineering*, Second Edition, Archers and Elevators Publishing House, Bangalore.
3) Rajput, R.K., *Elements of Mechanical Engineering*, S. Chand & Company, New Delhi, Latest Edition.

Reference Books:

1) Nag, P.K., *Elements of Mechanical Engineering*, Tata McGraw Hill, New Delhi, Latest Edition.
2) Sharma, P.C. and Purohit, D.K., *Introduction to Mechanical Engineering*, S.K. Kataria & Sons, Delhi, Latest Edition
3) Aggarwal, K.M., *Elements of Mechanical Engineering*, S. Chand & Company, New Delhi, Latest Edition.
4) Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/@nithinsk5825
- http://nptel.ac.in/courses/112104258/
- http://nptel.ac.in/courses/112103019/
- http://nptel.ac.in/courses/112103215/
- http://online.vtu.ac.in/course-details/18ME1525-Elements-of-Mechanical-Engineering
- http://vtuonline.in/course-details/18ME1525-elements-of-mechanical-engineering
- https://www.makino.com/en-us/resources/content-library/videos

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

- **Activity 1**: Collect samples or images of different energy sources (solar panels, coal, wind turbine models, biogas setups).
- **Activity 2**: Use miniature models of steam turbines, gas turbines, and hydraulic turbines.
- **Activity 3**: Setup and demonstrate basic refrigeration and air conditioning units.
- **Activity 4**: Conduct practical sessions on lathe, milling, or drilling machines and perform simple metal
- **Activity: Use programmable** robots or simple automation kits to demonstrate robotic arm movement or assembly line automation.

Engineering Chemistry Laboratory		**Semester**	**I/II**
Course Code	**BCHEL106/ BCHEL206**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0-0-2-0	SEE Marks	50
Total Hours of Pedagogy	25 Hrs	Total Marks	100
Credits	01	Exam Hours	03
Examination nature (SEE)	**Practical**		

Course Objectives:

- Challenged to analyse data, draw conclusions, and make informed decisions based on their observations and experiments.
- Learn to think critically, solve problems, and apply scientific principles in a practical context.
- To provide students with hands-on experience and practical skills in applying theoretical chemistry concepts to real-world engineering problems

Sl.NO	**List of experiments**
	PART-A
1	Determination of total hardness in water by complexometric titration.
2	Determination of total alkalinity of soda ash.
3	Analysis of chromate-dichromate mixture by acid-base titration.
4	Determination of manganese dioxide in pyrolusite by permanganate method.
5	Determination of Iron in the Hematite ore by dichromate method.
6	Determination of Chemical Oxygen Demand (COD) of the given industrial waste water sample.
7	Determination of Calcium Oxide (CaO) in the given sample of cement by Rapid EDTA method.
	PART-B
8	Determination of Iron (II) by Potentiometric titration.
9	Conductometric titration of a mixture of HCl and CH3COOH against NaOH.
10	Determination of dissociation constant of a weak acid using pH meter.
11	Colorimetric method for the determination of Iron (III) using thiocyanate.
12	Determination of chromium in industrial waste by colorimetric method using diphenyl carbazide reagent.
13	Electro gravimetric method for the determination of copper.

Course Outcomes (Course Skill Set):

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

- Carryout quantitative determination of analytes accurately and handling of some minor equipment's.
- Validation of the data and interpret the experimental results.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum 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 of **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.
- 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 final CIE marks scored by the student, and is equal to **50 marks**.

Semester End Evaluation (SEE):

- SEE marks for the practical course is **50** Marks.
- SEE shall be conducted jointly by the two 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 examiners.
- Students can pick question(s) (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)
- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part to be made zero.
- The duration of SEE is **03** hours.

Suggested Learning Resources:

- https://www.youtube.com/watch?v=yPNhAks7mtE&list=PLmB0ThS_49Y6sr4kXOr-KPBtKEOyy7tPn
- https://www.youtube.com/watch?v=r5bvqwiZ9As&list=PLmB0ThS_49Y6sr4kXOr-KPBtKEOyy7tPn&index=3
- https://www.youtube.com/watch?v=WzQyCu8n0VM&list=PLmB0ThS_49Y6sr4kXOr-KPBtKEOyy7tPn&index=4
- https://www.youtube.com/watch?v=hW5D4FJH8aI&list=PLmB0ThS_49Y6sr4kXOr-KPBtKEOyy7tPn&index=7

Computer Programming Laboratory		**Semester**	**I/II**
Course Code	**BCPL107/BCPL207**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	0-0-2-0	SEE Marks	50
Total Hours of Pedagogy	25 Hrs	Total Marks	100
Credits	01	Exam Hours	03
Examination nature (SEE)	**Practical**		

Course Objectives:

- **To develop fundamental programming skills** by implementing basic input/output operations, arithmetic calculations, and control structures using the C programming language.
- **To apply problem-solving techniques** using loops, conditional statements, and modular programming (functions) for real-time computational tasks such as number manipulation, sorting, and searching.
- **To introduce the use of arrays, strings, structures, and pointers** for effective data storage, retrieval, and processing in practical scenarios including matrix operations, statistical calculations, and student data management.
- **To enhance logical and analytical thinking** through the implementation of advanced programming concepts such as recursion, file handling, and user-defined data types in solving real-world problems.

Sl. No.	Experiments
1	**Basic Output & Input Programs** i. Write a C program to print "Hello, World!". ii. Write a C program to display your name, age, and college name. iii. Write a C program to calculate the area and perimeter of a rectangle. iv. Write a C program to convert Celsius to Fahrenheit.
2	**Basic Arithmetic Operations** i. Write a C program to add, subtract, multiply and divide two numbers. ii. Write a C program to divide two numbers and print the quotient and remainder. iii. Write a C program to calculate the average of three numbers.
3	**Develop a C program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.**
4	**Write a C program to perform arithmetic operations using switch statement.**
5	**Develop a program to find the reverse of a positive integer and check for palindrome or not using while- loop and display appropriate messages wherever necessary.**
6	**Develop a C program to generate the first ‘n’ terms of the Fibonacci sequence using for-loop.**
7	**Develop a C Program to Sort the Array elements in an Ascending Order for,** **i.** Bubble sort ii. Selection Sort.
8	**Develop a C Program to search for an element in an array using** **i.** Linear Search **ii.** Binary Search Display appropriate messages for successful and unsuccessful attempts.
9	**Implement a C program using function to check whether the given number is prime or not.**

10	**Develop a program to introduce 2D Array manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked.**
11	**Develop a C program to find the square root of a given number N and execute for all possible inputs with appropriate messages.** Note: Don’t use library function sqrt(n).
	Demonstration Experiments (For CIE)
12	**Develop a C Program using structure** **i.** To read student information such as (Sname, RollNo, Marks in 3 subjects) **ii.** Compute average- marks and appropriate grades. (S:98% to 100%, A+: 95 to 97%, A: 94 to 90%, B- 85 to 89%, C- 84% to 80%, D- 79% to 65%, E- >35% to 64%, F: <35%) Print student details along with computed grade for a class of ‘N ‘students.
13	**Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers.**
14	**Implement Recursive functions for Binary to Decimal Conversion.**
15	**Write a C program to copy the contents of one file (t1.txt) to another file (t2.txt).**

Course Outcomes (Course Skill Set):

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

CO 1 Understand and apply the fundamental concepts of C programming such as data types, operators, input/output functions, and control statements.
↳ (Linked to Programs 1.i–1.v, 2.i–2.v, 4, 5, 6)

CO 2 Implement decision-making, looping constructs, and function-based programming to solve basic computational problems.
↳ (Linked to Programs 3, 5, 6, 8.i, 9, 14)

CO 3 Develop programs using arrays, sorting, searching algorithms, and perform matrix operations using 1D and 2D arrays.
↳ (Linked to Programs 7, 8.i, 8.ii, 10)

CO 4 Apply structures, pointers, and file handling techniques for data manipulation and real-world problem solving.
↳ (Linked to Programs 12, 13, 15)

CO 5 Demonstrate problem-solving skills through writing, testing, and debugging efficient C programs, and interpret the output to derive meaningful insights.\
↳ (Linked to All Programs with emphasis on Programs 11, 14, Error-handling in 3, 5, 8, etc.)

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum 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 of **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.
- 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 final CIE marks scored by the student, and is equal to **50 marks**.

Semester End Evaluation (SEE):

- SEE marks for the practical course is **50** Marks.
- SEE shall be conducted jointly by the two 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 examiners.
- Students can pick question(s) (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)
- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part to be made zero.
- The duration of SEE is **03** hours.

Suggested Learning Resources:

Books:

1. *Programming in ANSI C* by E. Balagurusamy – McGraw Hill Education.
2. *Let Us C* by Yashavant Kanetkar – BPB Publications.
3. *The C Programming Language* by Brian W. Kernighan and Dennis M. Ritchie – Prentice Hall
4. *Computer Fundamentals and Programming in C* by Reema Thareja – Oxford University Press

Online Platforms & Tutorials:

1. GeeksforGeeks – C Programming Language
2. TutorialsPoint – C Programming
3. Programiz – Learn C Programming
4. NPTEL Online Courses – Programming in C

Compiler Tools & IDEs:

1. **Code::Blocks** – Free C/C++ IDE
2. **Turbo C** (For academic purposes)
3. **GCC (GNU Compiler Collection)**
4. **Online GDB** and **replit.com** – Web-based C compilers for hands-on practice

Video Resources:

1. NPTEL Lectures on C Programming by Prof. Anupam Basu / Prof. Satyadev Nandakumar.
2. YouTube Channels: *Gate Smashers, Neso Academy, Jenny's Lectures CS/IT NET&JRF.*

II Semester – BE (Common to all branches)

Professional Writing Skills in English		Semester	II
Course Code	**BEGH208**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0	SEE Marks	--
Total Hours of Pedagogy	15 Hours	Total Marks	50
Credits	01	Exam Hours	--
Examination nature (SEE)	**No SEE**		

Course Objectives:

The course 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 Technique 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.

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.

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.

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.

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 resumes, 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.

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).

Course outcome (Course Skill Set)

At the end of the course 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)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 30 questions) each of **30 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

The sum of average marks of three tests and two assessments will be the final CIE, and shall be equal to **50 marks.**

Semester End Examinations (SEE)

No SEE for a course of 01 credit of theory type.

Suggested Learning Resources:

1. **A Course in Technical English,** Cambridge University Press – 2020.
2. **Functional English,** 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

I/II Semester – AEC Course

Scientific Foundations of Health		Semester	I/II
Course Code	**BSFH109/209**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0	SEE Marks	--
Total Hours of Pedagogy	15 Hrs	Total Marks	50
Credits	01	Exam Hours	--
Examination nature (SEE)	**No SEE**		

Course Objectives:

This course 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.

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,

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,

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.

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.

Course outcome (Course Skill Set)

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

CO 1: Understand Health and wellness (and its Beliefs)
CO 2: Acquire Good Health & It's balance for positive mindset
CO 3: Inculcate and develop the healthy lifestyle habits for good health.
CO 4: Create of Healthy and caring relationships to meet the requirements of MNC and LPG world
CO 5: Adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus.
CO 6: Explain the positiveness to fight against harmful diseases for good health through positive mindset.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

Three Tests (preferably in MCQ pattern with 30 questions) each of **30 Marks (duration 01 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment-1: Two assignments (min.) for an average of **10 Marks (after scale down).**

- First assignment at the end of 4th week of the semester

- Second assignment at the end of 9th week of the semester to cover all COs suitably.

Assessment-2: Quiz/Group discussion/Seminar etc any one of the suitably planned activities to attain the COs and POs for **10 Marks** (**duration 01 hours**)

- The sum of average marks of three tests and two assessments will be the final CIE, and shall be equal to **50 marks.**

Semester End Examinations (SEE)

- **No SEE** for a course of 01 credit of theory type.

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 & Wellness) - 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

Engineering Mathematics - II		Semester	II
Course Code	**BMAT201**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Total Marks	100
Credits	4	Exam Hours	3
Examination nature (SEE)	**Theory**		

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

- Explain the basic concepts of vector calculus, higher order differential equations, Laplace transforms and advanced linear algebra.
- Apply the above concepts of the syllabus in their respective branches of engineering.
- Analyse the solutions of engineering problems using these concepts.
- Verifying the Mathematical solutions using modern Mathematical tools namely MATHEMATICA/MATLAB/PYTHON/SCILAB.

Teaching-Learning Process (General Instructions)

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

- Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
- Chalk and Talk method for Problem Solving.
- Adopt flipped classroom teaching method.
- Adopt collaborative (Group Learning) learning in the class.
- Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.

MODULE-1

Higher Order Differential Equations

Inverse Differential Operator: Particular integral of the form e^{ax}, $\sin ax$, polynomials and $e^{ax}V(x)$(up to third order) and Variation of Parameters.

Differential Equation with variable coefficient: Cauchy's and Legendre differential equations.

Applications: Problems on LRC circuit leading to higher order differential equation. Problems on forced oscillation leading to homogeneous linear ODE.

MODULE-2

Power Series Solutions

Frobenius method of Power Series (only second order), Bessel's Differential Equation leading to $J_n(x), J_{1/2}(x), J_{-1/2}(x)$. Legendre's Differential Equations, Rodrigues formula (without proof), Legendre's Polynomial.

MODULE-3

Vector Calculus

Vector Point Differential Operator (VPDO) - Gradient of a scalar field (angle between two surfaces & Directional Derivatives), Divergence and Curl of Vector field and its properties (Solenoidal and Irrotational). Line integrals, Green's theorem, Stoke's theorem, and Gauss Divergence theorem.

Applications: Problems on calculating work done using line integrals. Problems on finding the outward flux of a field using Green's theorem.

MODULE-4
Laplace Transforms
Definition of Laplace transformation and Laplace transforms of elementary functions (statements only). Laplace transforms of Periodic functions and unit-step functions (problems only). Inverse Laplace Transforms: Inverse Laplace transforms by method of partial fractions, Convolution theorem to find the inverse Laplace transforms. Solution of linear differential equations using Laplace transforms. **Applications:** Problems on Laplace transforms related to electric circuits.
MODULE 5
Advanced Linear Algebra
Vector Space, basis and span, subspace, linear Transformation (LT), Matrix representation of LT, Change of basis, Rank nullity theorem, inverse LT.

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Suggested software: Free and Open-Source Software (FOSS) tools like Mathematica/MATLAB/Python/Scilab.

Sl.No.	Experiments
1	Finding the solutions of second order ODEs by using dsolve operator/ode45 solver.
2	Finding the solutions of third order ODEs by using dsolve operator/ode45 solver.
3	Gradient of a scalar point function.
4	Divergence and curl of a vector point function and their geometrical interpretation.
5	Verification of Green's theorem.
6	Laplace transforms of elementary functions.
7	Solving differential equations by using Laplace Transforms.
8	Computation of basis and dimension for a vector space.
9	Linear transformation.
10	Graphical representation of linear transformation.

Course Outcomes (Course Skill Set):

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

CO1- Explain the basic concepts of calculus for a single and multivariable functions. Apply the concepts in their respective branches of engineering.

CO2- Recall the basic definitions and methods of solving first order first degree ordinary differential equations. Discuss some methods of solving first order first degree ordinary differential equations with some applications of Engineering problems.

CO3- Explain the basic concepts of double and triple integrals, beta and gamma functions and its applications to solving some Engineering problems.

CO4- Describe the various concepts of infinite series, numerical methods and its applications to solve some Engineering problems.

CO5- Recall the basic concepts of matrix theory and discuss the various methods of solving system of linear equations, eigen values and eigen vectors. Employing the linear algebra concepts in some Engineering contexts.

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 marks is 40% of the maximum marks under each heading, and on overall 40% of maximum marks of 50 (i.e., 20 out of 50 marks) in final CIE. 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 40% (20 Marks out of 50) in the Semester End Examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of IPCC:

Three Unit Tests each of **30 Marks (duration 01.15 hour**)

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Assessment: One assignment (min.) or **Quiz** for an average of **10 Marks (after scale down).**

- Assignment or the quiz before the end of 3rd test of the semester for covering all COs.

The sum of average of three tests scale-down to **20 marks** and an assessment of **10 marks** will be the CIE marks for the theory component of IPCC for **30 marks**.

CIE for the practical component of IPCC:

- The split-up of CIE marks for record/ journal and test are in the ratio of **60:40.**
- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The**12 marks** are for conducting the experiment and preparation of the laboratory record, and the other **08 marks** shall be for a test to be conducted during the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups, continuous evaluations etc are added and scaled down to **12 marks**.
- The laboratory test **(duration 02/03 hours)** before the end of 15th week of the semester shall be conducted for 50 marks and scaled down to **08 marks.**

Scaled-down marks of write-up evaluations and tests added will be the CIE marks for the laboratory component of IPCC for **20 marks**.

The **final CIE** is the sum of CIE from Theory and the CIE from Practical/Laboratory, and is equal to **50 marks.**

SEE for IPCC:

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 main questions. Each main question is set for 20 marks.
- There will be 2 main 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 must answer 5 full main questions, selecting one full main question from each module.
- Marks scored shall be proportionally reduced to **50** marks.

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component.

- The minimum marks to be secured in CIE to appear for SEE shall be the 12 (40% of maximum marks-30) in the theory component and 08 (40% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included**.** The maximum of 20% of each main question can be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks in a course.
- SEE will be conducted for 100 marks and students shall secure 40% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50.

Suggested Learning Resources:

Text Books

1. Erwin Kreyszig, *Advanced Engineering Mathematics*, Latest edition, Wiley Publications.
2. B.S. Grewal, *Higher Engineering Mathematics*, Latest edition, Khanna Publishers.
3. Gilbert Strang, *Linear Algebra and its Applications*, Wellesley Publishers.
4. B.V. Ramana, *Higher Engineering Mathematics*, Latest edition, Tata McGraw Hill.

Reference Books:

1. Srimanta Pal & Subodh C. Bhunia: “Engineering Mathematics” Oxford University Press, 3rd Ed., 2016.
2. N.P Bali and Manish Goyal: “A Textbook of Engineering Mathematics” (Volume I & II) Laxmi Publications, 10th Ed., 2019.
3. Gupta C.B, Singh S.R and Mukesh Kumar: “Engineering Mathematics for Semester I and II”, Mc-Graw Hill Education (India) Pvt. Ltd 2015.
4. H. K. Dass and Er. Rajnish Verma: “Higher Engineering Mathematics” S. Chand Publication, 3rd Ed., 2014.

Web links and Video Lectures (e-Resources):

- **http://nptel.ac.in/courses.php?disciplineID=111**
- **http://www.class-central.com/subject/math(MOOCs)**
- **http://academicearth.org/**

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

- **Quizzes**
- **Assignments**
- **Seminar**