VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Scheme of Teaching and Examination 2018 – 19

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

(Effective from the academic year 2018 – 19)

I SEMESTER B.E./B.Tech (PHYSICS GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	18MAT11	Calculus and Linear Algebra	Mathematics	Maths	3	2	--	03	40	60	100	4
2	BSC	18PHY12	Engineering Physics	Physics	Physics	3	2	--	03	40	60	100	4
3	ESC	18ELE13	Basic Electrical Engineering	E and E Engineering	E and E Engineering	2	2	--	03	40	60	100	3
4	ESC	18CIV14	Elements of Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	2	2	--	03	40	60	100	3
5	ESC	18EGDL15	Engineering Graphics	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	--	2	03	40	60	100	3
6	BSC	18PHYL16	Engineering Physics Laboratory	Physics	Physics	--	--	2	03	40	60	100	1
7	ESC	18ELEL17	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	40	60	100	1
8	HSMC	18EGH18	Technical English–I	Humanities	Humanities	--	2	--	03	40	60	100	1
					TOTAL	**12**	**10**	**06**	**24**	**320**	**480**	**800**	**20**

Note: BSC: Basic Science Courses, ESC: Engineering Science Courses, HSMC: Humanity, Social Science and Management Courses.

Definition of Credit:	1 hour Lecture (L) per week per semester =1 Credit 2 hour Tutorial (T) per week per semester =1 Credit 2 hour Practical/Laboratory/Drawing (P) per week per semester =1 Credit.

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Scheme of Teaching and Examination 2018 – 19

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

(Effective from the academic year 2018 – 19)

I SEMESTER B.E./B.Tech (CHEMISTRY GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	18MAT11	Calculus and Linear Algebra	Mathematics	Mathematics	3	2	--	03	40	60	100	4
2	BSC	18CHE12	Engineering Chemistry	Chemistry	Chemistry	3	2	--	03	40	60	100	4
3	ESC	18CPS13	C Programming for Problem Solving	Computer Science and Engineering	Computer Science and Engineering	2	2	--	03	40	60	100	3
4	ESC	18ELN14	Basic Electronics	ECE/E and I/ TC	E and C Engineering	2	2	--	03	40	60	100	3
5	ESC	18ME15	Elements of Mechanical Engineering	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	2	--	03	40	60	100	3
6	BSC	18CHEL16	Engineering Chemistry Laboratory	Chemistry	Chemistry	--	--	2	03	40	60	100	1
7	ESC	18CPL17	C Programming Laboratory	Computer Science and Engineering	Computer Science and Engineering	--	--	2	03	40	60	100	1
8	HSMC	18EGH18	Technical English– I	Humanities	Humanities	--	2	--	03	40	60	100	1
					TOTAL	**12**	**12**	**04**	**24**	**320**	**480**	**800**	**20**

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II SEMESTER B.E./B.Tech (PHYSICS GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	18MAT21	Advanced Calculus and Numerical Methods	Mathematics	Mathematics	3	2	--	03	40	60	100	4
2	BSC	18PHY22	Engineering Physics	Physics	Physics	3	2	--	03	40	60	100	4
3	ESC	18ELE23	Basic Electrical Engineering	E and E Engineering	E and E Engineering	2	2	--	03	40	60	100	3
4	ESC	18CIV24	Elements of Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	2	2	--	03	40	60	100	3
5	ESC	18EGDL25	Engineering Graphics	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	--	2	03	40	60	100	3
6	BSC	18PHYL26	Engineering Physics Laboratory	Physics	Physics	--	--	2	03	40	60	100	1
7	ESC	18ELEL27	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--	--	2	03	40	60	100	1
8	HSMC	18EGH28	Technical English– II	Humanities	Humanities	--	2	--	03	40	60	100	1
					TOTAL	**12**	**10**	**06**	**24**	**320**	**480**	**800**	**20**

Note: BSC: Basic Science Courses, ESC: Engineering Science Courses, HSMC: Humanity, Social Science and Management Courses.

Definition of Credit:	1 hour Lecture (L) per week per semester =1 Credit 2 hour Tutorial (T) per week per semester =1 Credit 2 hour Practical/Laboratory/Drawing (P) per week per semester =1 Credit.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

Scheme of Teaching and Examination 2018 – 19

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

(Effective from the academic year 2018 – 19)

II SEMESTER B.E./B.Tech (CHEMISTRY GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BSC	18MAT21	Advanced Calculus and Numerical Methods	Mathematics	Maths	3	2	--	03	40	60	100	4
2	BSC	18CHE22	Engineering Chemistry	Chemistry	Chemistry	3	2	--	03	40	60	100	4
3	ESC	18CPS23	C Programming for Problem Solving	Computer Science and Engineering	Computer Science and Engineering	2	2	--	03	40	60	100	3
4	ESC	18ELN24	Basic Electronics	ECE/E and I/ TC	E and C Engineering	2	2	--	03	40	60	100	3
5	ESC	18ME25	Elements of Mechanical Engineering	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	2	--	03	40	60	100	3
6	BSC	18CHEL26	Engineering Chemistry Laboratory	Chemistry	Chemistry	--	--	2	03	40	60	100	1
7	ESC	18CPL27	C Programming Laboratory	Computer Science and Engineering	Computer Science and Engineering	--	--	2	03	40	60	100	1
8	HSMC	18EGH28	Technical English– II	Humanities	Humanities	--	2	--	03	40	60	100	1
					TOTAL	**12**	**12**	**04**	**24**	**320**	**480**	**800**	**20**

Note: BSC: Basic Science Courses, ESC: Engineering Science Courses, HSMC: Humanity, Social Science and Management Courses.

Definition of Credit:	1 hour Lecture (L) per week per semester =1 Credit 2 hour Tutorial (T) per week per semester =1 Credit 2 hour Practical/Laboratory/Drawing (P) per week per semester =1 Credit.

CALCULUS AND LINEAR ALGEBRA

Semester	**: I**	**CIE Marks**	**: 40**
Course Code	**: 18MAT11**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 3:2:0**	**Exam Hours**	**: 03**
	Credits : 04		

Course Learning Objectives: This course Calculus and Linear Algebra **(18MAT11)** will enable students:

- To familiarize the important tools of calculus and differential equations that are essential in all branches of engineering.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

MODULE-I

Differential Calculus-1: Review of elementary differential calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian and polar forms; Centre and circle of curvature (All without proof-formulae only) –applications to evolutes and involutes.

(RBT Levels: L1 & L2)

MODULE-II

Differential Calculus-2: Taylor's and Maclaurin's series expansions for one variable (statements only), indeterminate forms - L'Hospital's rule. Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables; Method of Lagrange multipliers with one subsidiary condition. Applications of maxima and minima with illustrative examples. Jacobians-simple problems.

(RBT Levels: L1 & L2)

MODULE-III

Integral Calculus: Review of elementary integral calculus.

Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals- change of order of integration and changing into polar co-ordinates. Applications to find area volume and centre of gravity

Beta and Gamma functions: Definitions, Relation between beta and gamma functions and simple problems.

(RBT Levels: L1 & L2)

MODULE-IV

Ordinary differential equations (ODE's) of first order:

Exact and reducible to exact differential equations. Bernoulli's equation.

Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits. Nonlinear differential equations: Introduction to general and singular solutions ; Solvable for p only; Clairaut's and reducible to Clairaut's equations only. **(RBT Levels : L1, L2 & L3)**

MODULE-V

Linear Algebra: Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method, Gauss –Jordan method and Approximate solution by Gauss-Seidel method. Eigen values and eigenvectors-Rayleigh's power method. Diagonalization of a square matrix of order two.

(RBT Levels : L1, L2 & L3)

Textbooks:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, 2. McGraw-Hill Book Co., New York, 1995.
2. James Stewart : "Calculus –Early Transcendentals", Cengage Learning India Private Ltd., 2017.
3. B.V.Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. Srimanta Pal & Subobh C Bhunia: "Engineering Mathematics", Oxford University Press, 3rd Reprint, 2016.
5. Gupta C.B., Singh S.R. and Mukesh Kumar: "Engineering Mathematics for Semester I & II", Mc-Graw Hill Education (India) Pvt.Ltd., 2015.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU EDUSAT PROGRAMME - 20

Course Outcomes: On completion of this course, students are able to:

CO1 : Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.

CO2 : Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO3 : Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.

CO4 : Solve first order linear/nonlinear differential equation analytically using standard methods

CO5 : Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.

Question Paper Pattern:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 60.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

ENGINEERING PHYSICS

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18PHY12/22**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 3:2:0**	**Exam Hours**	**: 03**
	Credits : 04		

Course Learning Objectives:

This course **(18PHY12/22)** will enable students to

- Learn the basic concepts in Physics which are very much essential in understanding and solving engineering related challenges.
- Gain the knowledge of newer concepts in modern physics for the better appreciation of modern technology

MODULE-I

Oscillations and Waves

Free Oscillations: Definition of SHM, derivation of equation for SHM, Mechanical simple harmonic oscillators (mass suspended to spring oscillator), complex notation and phasor representation of simple harmonic motion. Equation of motion for free oscillations, Natural frequency of oscillations.

Damped and forced oscillations: Theory of damped oscillations: over damping, critical & under damping, quality factor. Theory of forced oscillations and resonance, Sharpness of resonance. One example for mechanical resonance.

Shock waves: Mach number, Properties of Shock waves, control volume. Laws of conservation of mass, energy and momentum. Construction and working of Reddy shock tube, applications of shock waves.

Numerical problems

(RBT Levels : L1, L2 & L3)

MODULE-II

Elastic properties of materials:

Elasticity: Concept of elasticity, plasticity, stress, strain, tensile stress, shear stress, compressive stress, strain hardening and strain softening, failure (fracture/fatigue), Hooke's law, different elastic moduli: Poisson's ratio, Expression for Young's modulus (Y), Bulk modulus (K) and Rigidity modulus (n) in terms of and β. Relation between Y, n and K, Limits of Poisson's ratio.

Bending of beams: Neutral surface and neutral plane, Derivation of expression for bending moment. Bending moment of a beam with circular and rectangular cross section. Single cantilever, derivation of expression for Young's' modulus.

Torsion of cylinder: Expression for couple per unit twist of a solid cylinder (Derivation), Torsional pendulum-Expression for period of oscillation.
Numerical problems.

(RBT Levels : L1, L2 & L3)

MODULE- III

Maxwell's equations, EM waves and Optical fibers

Maxwell's equations: Fundamentals of vector calculus. Divergence and curl of electric field and magnetic field (static), Gauss' divergence theorem and Stokes' theorem. Description of laws of electrostatics, magnetism and Faraday's laws of EMI. Current density & equation of Continuity; displacement current (with derivation) Maxwell's equations in vacuum.

EM Waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane electromagnetic waves in vacuum, their transverse nature, polarization of EM waves (Qualitative).

Optical fibers: Propagation mechanism, angle of acceptance. Numerical aperture. Modes of propagation and Types of optical fibers. Attenuation: Causes of attenuation and Mention of expression for attenuation coefficient. Discussion of block diagram of point to point communication. Merits and demerits Numerical problems.

(RBT Levels : L1 & L2)

MODULE IV

Quantum Mechanics and Lasers

Quantum mechanics: Introduction to Quantum mechanics, Wave nature of particles, Heisenberg's uncertainty principle and applications (non confinement of electron in the nucleus), Schrodinger time independent wave equation, Significance of Wave function, Normalization, Particle in a box, Energy eigen values of a particle in a box and probability densities.

Lasers: Review of spontaneous and stimulated processes, Einstein's coefficients (derivation of expression for energy density). Requisites of a Laser system. Conditions for laser action. Principle, Construction and working of CO_2 and semiconductor Lasers.
Application of Lasers in Defense (Laser range finder) and Engineering (Data storage).
Numerical problems

(RBT Levels : L1, L2 & L3)

MODULE-V

Material science

Quantum Free electron theory of metals: Review of classical free electron theory, mention of failures. Assumptions of Quantum Free electron theory,

Mention of expression for density of states, Fermi-Dirac statistics (qualitative), Fermi factor, Fermi level, Derivation of the expression for Fermi energy, Success of QFET.

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

Dielectric materials: polar and non-polar dielectrics, internal fields in a solid, Clausius-Mossotti equation(Derivation), mention of solid, liquid and gaseous dielectrics with one example each. Application of dielectrics in transformers. Numerical problems.

(RBT Levels : L1, L2 & L3)

Textbooks:

1. A Text book of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand & Company Ltd, New Delhi.
2. Engineering Physics-Gaur and Gupta Dhanpat Rai Publications-2017.
3. Concepts of Modern Physics-Arthur Beiser: 6th Ed, Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.

Reference books:

1. Introduction to Mechanics, MK Verma: 2nd Ed, University Press(India) Pvt Ltd, Hyderabad 2009.
2. Lasers and Non Linear Optics, BB laud, 3rd Ed, New Age International Publishers 2011.
3. Solid State Physics-S O Pillai, 8th Ed New Age International Publishers-2018.
4. Shock waves made simple- Chintoo S Kumar, K Takayama and KPJ Reddy: Willey India Pvt. Ltd., New Delhi, 2014.
5. Introduction to Electrodynamics, David Griffiths, 4th Ed, Cambridge University Press 2017.

Course Outcomes:

Upon completion of this course, students will be able to

1. Understand various types of oscillations and their implications, the role of Shock waves in various fields and Recognize the elastic properties of materials for engineering applications.
2. Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
3. Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation.
4. Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields

5. Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

Question paper pattern:

Note:- The SEE question paper will be set for 100 marks and the marks will be proportionately reduced to 60.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

BASIC ELECTRICAL ENGINEERING

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18ELE13/23**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 2:2:0**	**Exam Hours**	**: 03**
	Credits : 03		

Lecture hours per module: Six hours and Tutorials per module: **one of 2 hours**

Course Objectives:

- To explain Ohm's law and Kirchhoff's laws used for the analysis of DC circuits.
- To explain fundamentals of AC circuits and the behaviour of R, L and C and their combinations in AC circuits.
- To discuss three phase balanced circuits.
- To explain principle of operation, construction and performance of electrical machines such as single phase transformer, DC machines, synchronous generator and three phase induction motor.
- To introduce concepts of electrical wiring, circuit protecting devices and earthing.

MODULE-I

D.C.Circuits: Ohm's Law and Kirchhoff's Laws, analysis of series, parallel and series- parallel circuits excited by independent voltage sources. Power and Energy.

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

(RBT Levels : L1, L2, L3 & L4)

MODULE - 2

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

Three Phase circuits: Advantages of 3-phase power, Generation of 3-phase power, Three-phase balanced circuits, voltage and current relations in star and delta connections. Measurement of three phase power using two wattmeter method.

(RBT Levels : L1, L2, L3 & L4)

MODULE - 3

Single Phase Transformers: Necessity of transformer, Principle of operation, Types and construction of transformers. emf equation, losses, variation of losses with respect to load, efficiency, Condition for maximum efficiency.

Domestic Wiring: Service mains, meter board and distribution board. Brief discussion on concealed conduit wiring. Two-way and three-way control. Elementary discussion on circuit protective devices: Fuse and Miniature Circuit Breaker (MCB's),electric shock, precautions against shock. Earthing: Pipe and Plate earthing.

(RBT Levels : L1, L2 & L3)

MODULE – 4

DC Generators: Principle of operation, Construction of D.C. Generators. Expression for induced emf,Types of D.C. Generators,Relation between induced emf and terminal voltage.

DC motors: Principle of operation,Back emf,Torque equation, Types of dc motors, Characteristics of dc motors (shunt and series motors only) and Applications.

(RBT Levels : L1, L2 & L3)

MODULE – 5

Three Phase Synchronous Generators: Principle of operation, Constructional details, Synchronous speed, Frequency of generated voltage, emf equation, Concept of winding factor (excluding the derivation and calculation of distribution and pitch factors).

Three Phase Induction Motors: Principle of operation, Generation of rotating magnetic field, Construction and working of three-phase induction motor, Slip and its significance. Necessity of starter, star-delta starter.

(RBT Levels : L1, L2 & L3)

Textbooks:

1 Basic Electrical Engineering, D C Kulshreshtha, Tata McGraw Hill, Revised First Edition.

2 Principles of Electrical Engineering & Electronics, V.K. Mehta, Rohit Mehta, S.ChandPublications.

Reference Books:

1 Fundamentals of Electrical Engineering and Electronics, B. L. Theraja, S. Chand & Company Ltd, Reprint Edition 2013.

2 Electrical Technology, E. Hughes, International Students 9th Edition, Pearson, 2005.

3 Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, 2017.

Course Outcomes:

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

- Analyse D.C and A.C circuits.
- Explain the principle of operation andconstruction of single phase transformers.

- Explain the principle of operation andconstruction of DC machines and synchronous machines.
- Explain the principle of operation and construction of three phase induction motors.
- Discuss concepts of electrical wiring, circuit protecting devices and earthing.

Graduate Attributes (As per NBA): Engineering Knowledge, Problem Analysis.

Question paper pattern:

- The question paper will have ten questions. Each question is set for 20 marks.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub questions), should have a mix of topics under that module.
- The students have to answer 5 full questions, selecting one full question from each module.

ELEMENTS OF CIVIL ENGINEERING AND MECHANICS

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18CIV14/24**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 2:2:0**	**Exam Hours**	**: 03**
	Credits : 03		

Course Objectives:

The objectives of this course are:

- To make students to learn Scope of various fields of Civil Engineering, basics of civil engineering concepts and importance of infrastructure development.
- To develop a student's ability to analyze the problems involving Forces and Moments with their applications, Centroid and Moment of inertia and Kinetics of bodies.

Module-1

Introduction to Civil Engineering: Scope of different fields of Civil Engineering; Surveying, Building Materials, Construction Technology, Geotechnical Engineering, Structural Engineering, 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. **(RBT Level : L1)**

Introduction to Engineering Mechanics: Basic concepts of idealization- Particle, Continuum and Rigid Body; Force; Systems of Forces; Basic Principles – Physical Independence of forces, Superposition, Transmissibility, Newton's Laws of Motion, Resolution and Composition of forces, Law of parallelogram of forces, Polygonal law, Resultant of Concurrent coplanar force systems, Coplanar Non Concurrent Force System: Moment of a Forces, couple, Varignon's theorem, Resultant of Coplanar non-concurrent force system.

(RBT Level : L1, L2 & L3)

Module-2

Equilibrium of Forces: Free body diagrams, Lami's theorem, Equations of Equilibrium, equilibrium of concurrent and non concurrent coplanar force systems. **(RBT Level : L1, L2 & L3)**

Friction: Types of friction, Laws of dry Friction, Limiting friction, Concept of Static and Dynamic Friction; Numerical problems on motion of single and connected bodies on planes, wedge friction, ladder friction, rope and Pulley systems. **(RBT Level : L1, L2 & L3)**

Module-3

Support Reactions: Types of Loads and Supports, statically determinate and indeterminate beams, Support Reaction in beams, Numerical problems on support reactions for statically determinate beams (Point load, uniformly distributed & uniformly varying loads and Moments)

(RBT Level : L1, L2 & L3)

Analysis of Simple trusses: Types of trusses, Analysis of statically determinate trusses using method of joints and method of sections.

(RBT Level : L1, L2 & L3)

Module-4

Centroid: Centroid of simple figures from first principle, Centroid of composite/built-up sections; Moment of Inertia: Introduction, second moment of area of plane sections from first principles, Parallel axes and perpendicular axes Theorems, Radius of gyration, Moment of inertia of composite area and built-up sections.

Concept of Product of Inertia(No Problems)

(RBT Level : L1, L2 & L3)

Module-5

Kinematics: Definitions, Displacement, Average velocity, Instantaneous velocity, Speed, Acceleration, Average acceleration, Variable acceleration, Acceleration due to gravity, Newton's Laws of Motion. Rectilinear Motion–Numerical problems. Curvilinear Motion-Super elevation, Projectile Motion, Relative motion, Numerical problems. Motion under gravity, Numerical problems,

(RBT Level : L1, L2 & L3)

Kinetics: D'Alembert's principle and its applications in plane motion and connected bodies including pulleys

(RBT Level : L2 & L3)

Course outcomes: After a successful completion of the course, the student will be able to:

1. Mention the applications of various fields of Civil Engineering.
2. Compute the resultant of given force system subjected to various loads.
3. Comprehend the action of Forces, Moments and other loads on systems of rigid bodies and compute the reactive forces that develop as a result of the external loads.
4. Locate the Centroid and compute the Moment of Inertia of regular and built-up sections.
5. Express the relationship between the motion of bodies and analyze the bodies in motion.

Question paper pattern:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 60.
- The question paper will have ten full questions carrying equal marks.
- Each full question consisting of 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Textbooks:

1. R. C. Hibbler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
2. Bansal R.K., A Text Book of Engineering Mechanics, Laxmi Publications.

Reference Books:

1. Andy Ruina and Rudra Pratap , Introduction to Statics and Dynamics, Oxford University Press.
2. Reddy Vijaykumar K. and K. Suresh Kumar, Singer's Engineering Mechanics.
3. F. P. Beer and E. R. Johnston, Mechanics for Engineers, Statics and Dynamics, McGraw Hill.
4. Irving H. Shames, Engineering Mechanics, Prentice Hall.

ENGINEERING GRAPHICS

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18EGDL15/25**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 2:0:2**	**Exam Hours**	**: 03**
	Credits : 03		

Course Learning Objectives:

This course will enable students to

CLO1 To expose the students to standards and conventions followed in preparation of engineering drawings.

CLO2 To make them understand the concepts of orthographic and isometric projections.

CLO3 Develop the ability of conveying the engineering information through drawings.

CLO4 To make them understand the relevance of engineering drawing to different engineering domains.

CLO5 To develop the ability of producing engineering drawings using drawing instruments.

CLO6 To enable them to use computer aided drafting packages for the generation of drawings.

MODULE-I

Introduction to Computer Aided Sketching:

Introduction, Drawing Instruments and their uses, relevant BIS conventions and standards. Lettering, line conventions, dimensioning, material conventions, and free hand practicing.

Computer screen, layout of the software, standard tool bar / menu and description of most commonly used tool bars, and navigational tools.

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, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz., tangency, parallelism, inclination and perpendicularity.

MODULE-II

Orthographic projections of points, straight lines and planes:

Introduction, Definitions - Planes of projection, reference line and conventions employed. First angle and Third angle projection.

Projections of points in all the four quadrants.

Projections of straight lines (located in first quadrant/first angle only), true and apparent lengths, true and apparent inclinations to reference planes (No application problems and midpoint problems).

Orthographic projections of plane surfaces (First angle projection only):

Projections of regular plane surfaces–triangle, square, rectangle, pentagon, hexagon and circle-in simple positions inclined to both the planes; planes in different positions by change of position method only. (No problems on punched plates and composite plates).

MODULE – III

Projections of solids:

Introduction, definitions – projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, and cones with axis inclined to both the planes. (Solids resting on HP only and no problems on octahedrons, and freely suspended solids.)

MODULE IV

Development of Lateral Surfaces of Solids:

Introduction to section planes and sectional views.

Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with base on HP only. Development of their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, spheres and transition pieces).

MODULE-V

Isometric Projection (using isometric scale only)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of hexahedron(cube), right regular prisms, pyramids, cylinders, cones, and spheres. Isometric projection of combination of two simple solids. Conversion of given isometric/ pictorial views to orthographic views of simple objects.

Course Outcomes:

Upon completion of this course, students will be able to

CO1 Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.

CO2 Produce computer generated drawings using CAD software.

CO3 Use the knowledge of orthographic projections to represent engineering information / concepts and present the same in the form of drawings.

CO4 Develop isometric drawings of simple objects reading the orthographic projections of those objects.

CO5 Convert pictorial and isometric views of simple objects to orthographic views.

Question paper pattern:

- Module -1 is only for practice and CIE and not for examination.
- Question paper for each batch of students will be sent online by VTU and has to be downloaded before the commencement of Examination of each batch. The answer sheets will have to be jointly evaluated by the Internal & External examiners.
- A maximum of THREE questions will be set as per the following pattern (No mixing of questions from different Modules).

Scheme of evaluation:

From Chapters			Marks Allotted
Module 2 [Choice between (Lines or Planes)]			**25**
Module 3			**45**
Module 4 or Module 5			**30**
Total			**100**
Q. No.	**Solutions and sketching in the sketch book**	**Computer display and printout**	**Total Marks**
1	**15**	**10**	**25**
2	**25**	**20**	**45**
3	**20**	**10**	**30**
Total Marks	**60**	**40**	**100**

- Students have to submit the computer printouts and the sketches at the end of the examination. Both Internal & External examiners have to jointly evaluate the solutions (sketches) and computer display & printouts of each student for 100 marks (60 marks for solutions & sketches + 40 marks for computer display and printouts) and submit the marks list along with the solution (sketches) on graph sheets & computer printouts in separate covers.
- Each batch must consist of a maximum of 12 students.
- Examination can be conducted in parallel batches, if necessary.

Textbooks:

1. **Engineering Drawing** – N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat.
2. **Engineering Graphics** – K.R. Gopalakrishna, 32nd edition, 2005-Subash Publishers Bangalore.
3. **Computer Aided Engineering Drawing -** by Dr. M H Annaiah, Dr C N Chandrappa and Dr. B Sudheer Premkumar, Fifth edition, New Age International Publishers.

Reference Books:

1. **Computer Aided Engineering Drawing** – S. Trymbaka Murthy, – I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
2. **Engineering Drawing-**by N.S.Parthasarathy & Vela Murali, Oxford University Press, 2015
3. **Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-** Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi.
4. **A Primer on Computer Aided Engineering Drawing-**2006, Published by VTU, Belgaum.
5. **Publications of Bureau of Indian Standards**
   a) **IS 10711 – 2001:** Technical products documentation – Size and lay out of drawing sheets.
   b) **IS 9609 (Parts 0 & 1) – 2001:** Technical products documentation – Lettering.
   c) **IS 10714 (Part 20) – 2001 & SP 46 – 2003:** Lines for technical drawings.
   d) **IS 11669 – 1986 & SP 46 – 2003:** Dimensioning of Technical Drawings.
   e) **IS 15021 (Parts 1 to 4) – 2001:** Technical drawings – Projection Methods.

ENGINEERING PHYSICS LABORATORY

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18PHYL16/26**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 0:0:2**	**Exam Hours**	**: 03**
	Credits : 01		

Course Learning Objectives:

This course (18PHY16/26) will enable students

- To realize experimentally, the mechanical, electrical and thermal properties of materials, concept of waves and oscillations
- Design simple circuits and hence study the characteristics of semiconductor devices

Sl. No.	Title of the Experiment	To which Module it belongs
1	Determination of spring constants in Series and Parallel combination	I
2	Determination of Magnetic field intensity is along the axis of a circular coil carrying current(by deflection method)	III
3	n & I by Torsional pendulum (radius of the wire, mass and dimensions of the regular bodies to be given). (In the examination either n or I to be asked)	II
4	Young's modulus of a beam by Single Cantilever experiment (breadth and thickness of the beam to be given)	II
5	Radius of curvature of piano convex lens using Newton's rings(wavelength of light to be given)	III
6	Study Series and parallel LCR resonance and hence Calculate inductance, band width and quality factor using series LCR Resonance	I/III
7	Determine Acceptance angle and Numerical aperture of an optical fiber	III
8	Determine Wavelength of semiconductor laser using Laser diffraction by calculating grating constant.	IV
9	Estimation of Fermi Energy of Copper	V
10	Study of input and output Transistor characteristics and hence calculate input resistance, and	V
11	Draw photodiode characteristics and calculate power responsivity	V
12	Calculation of Dielectric constant by RC charging and Discharging	V

Note:

1.In addition to above experiments, Reddy shock tube must be introduced as compulsory demo experiment.

2.All 12 experiments are mandatory. Student has to perform 2 experiments in the semester end examination.

Course Outcomes:

Upon completion of this course, students will be able to

1. Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current
2. Understand the principles of operations of optical fibers and semiconductor devices such as Photodiode, and NPN transistor using simple circuits
3. Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
4. Recognize the resonance concept and its practical applications
5. Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

Scheme of Evaluation

(with effect from 2018-19 Scheme)

Subject : Engineering Physics Lab **Code : 18PHYL16/26**

The student has to perform **TWO** experiments during the practical examination of **THREE** hours duration. The scheme of valuation shall be as follows.

Sl. No.	Description	Max.Marks	**Part:A** Marks for **First** experiment	**Part:B** Marks for **Second** experiment
01	Write up: Formula, Tabular column and Circuit diagram/Ray Diagram	**16**	**4+2+2=08**	4+2+2=08
02	Experimental set up/Circuit connection	**10**	**05**	**05**
03	Conduction and reading	**40**	**20**	**20**
04	Graph, Calculations, Results and accuracy	**20**	**2+4+2+2=10**	2+4+2+2=10
06	Viva-Voce	**14**	**07**	**07**
Total		**100**	**50**	**50**

Note: The student is required to obtain a minimum of 40 % Marks in the practical examination to pass.

BASIC ELECTRICAL ENGINEERING LABORATORY

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18ELEL17/27**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 0:0:2**	**Exam Hours**	**: 03**
	Credits : 01		

Course Objectives:

- To provide exposure to common electrical components such as Resistors, capacitors and inductors, types of wires and measuring instruments.
- To measure power and power factor measurement of different types of lamps and three phase circuits.
- To explain measurement of impedance for R-L and R-C circuits.
- To determine power consumed in a 3 phase load.
- To determine earth resistance and explain methods of controlling a lamp from different places.

Orientation class for an exposure to:

- Resistors, capacitors, inductors, rheostats,diodes, transistors,types of wires, measuring instruments – voltmeter, ammeter, wattmeter, multi-meter, Regulated power supply, Function generator, oscilloscope, transformer, dc motor, synchronous generator, three phase induction motor etc.
- Basic safety precautions while dealing with electricity.

LIST OF EXPERIMENTS

1. Verification of KCL and KVL for DC circuits.
2. Measurement of current, power and power factor ofincandescent lamp, fluorescent lamp, and LED lamp.
3. Measurement of resistance and inductance of a choke coil using 3 voltmeter method.
4. Determination of phase and line quantities in three phase star and delta connected loads.
5. Measurement of three phase power using two wattmeter method.
6. Two way and three way control of lamp and formation of truth table.
7. Measurement of earth resistance.
8. Study of effect of open and short circuit in simple circuits.

Demonstration Experiments (for CIE only):

1. Demonstration of fuse and MCB separately by creating a fault.
2. Demonstration of cut-out sections of electrical machines (DC machines, Induction machines and synchronous machines).
3. Understanding ac and dc supply. Use of tester and test lamp to ascertain the healthy status of mains.
4. Understanding of UPS.

Revised Bloom's Taxonomy Levels L_1- Remembering, L_2- Understanding, L_3- Applying, L_4- Analysing

Course Outcomes:

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

- Identify the common electrical components and measuring instruments used for conducting experiments in the electrical laboratory.
- Compare power factor of lamps.
- Determine impedance of an electrical circuit and power consumed in a 3 phase load.
- Determine earth resistance and understand two way and three way control of lamps.

Graduate Attributes (As per NBA): Engineering Knowledge, Problem Analysis, Individual and Team work, Communication

Conduct of Practical Examination:

1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of answer script to be strictly adhered by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
4. Change of experiment is allowed only once and 15% Marks allotted to the procedure part shall be made zero.

TECHNICAL ENGLISH - I

Semester	**: I**	**CIE Marks**	**: 40**
Course Code	**: 18EGH18**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 0:2:0**	**Exam Hours**	**: 03**
	Credits : 01		

Course Learning Objectives:

The course Technical English – I will enable the students ,

- To impart basic English grammar and essentials of language skills
- To train to identify the nuances of phonetics, intonation and enhance pronunciation skills
- To enhance with English vocabulary and language proficiency

Language Lab

For augment LSRW and GV skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred.

Module - I

Introduction to Technical Communication

Fundamentals of Technical Communication Skills, Barriers to Effective Communication, Different styles in Technical Communication. Interpersonal Communication Skills, How to improve Interpersonal Communication Skills, Developing Interpersonal Skills.

Grammar : Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Articles, Conjunctions.

(RBT Levels : L1, L2 & L3)

Module - II

Introduction to Listening Skills and Phonetics – I

Introduction to Phonetics, Sounds Mispronounced, Silent and Non silent Letters, Homophones and Homonyms, Aspiration, Pronunciation of 'The', words ending 'age', some plural forms.

Articles: Use of Articles – Indefinite and Definite Articles.

(RBT Levels : L1, L2 & L3)

Module - III

Developing Listening Skills (Phonetics and Vocabulary Building) - II

Speech Sounds: Vowels and Consonants - Exercises on it. Preposition, kinds of Preposition and Prepositions often Confused. Word Accent – Rules for Word Accent, Stress Shift, Question Tags, Question Tags for Assertive Sentences(Statements) – Some Exceptions in Question Tags and Exercises, One Word Substitutes and Exercises.

Vocabulary – Synonyms and Antonyms, Exercises on it.

(RBT Levels : L1, L2 & L3)

Module - IV

Speaking Skills (Grammar and Vocabulary) – I

Syllables, Structures, Strong and Weak forms of words, Words formation - Prefixes and Suffixes (Vocabulary), Contractions and Abbreviations.

Spelling Rules and Words often Misspelt – Exercises on it. Word Pairs (Minimal Pairs) – Exercises, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it. **(RBT Levels : L1, L2 & L3)**

Module - V

Speaking Skills (Grammar and Vocabulary) – II

Extempore/Public Speaking, Difference between Extempore/Public Speaking, and Guidelines for Practice.

Mother Tongue Influence(MTI) – South Indian Speakers, Various Techniques for Neutralisation of Mother Tongue Influence – Exercises, Listening Comprehension – Exercises. Information Transfer : Oral Presentation - Examples. Common Errors in Pronunciation.

(RBT Levels : L1, L2 & L3)

Course Outcomes:

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

CO 1: Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronunciation

CO 2: Implement English vocabulary at command and language proficiency

CO 3: Identify common errors in spoken and written communication

CO 4: Understand and improve the non verbal communication and kinesics

CO 5: Perform well in campus recruitment, engineering and all other general competitive examinations

Question paper pattern for SEE (Semester end examination)

The SEE question paper will be set for 100 marks and the pattern of the question paper will be objective type (MCQ).

Textbooks

1) **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.

2) **English Language Communication Skills (Lab Manual cum Workbook),** Cengage learning India Pvt Limited [Latest Revised Edition] – 2018.

Reference Books

1) **English for Technical Communication** by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2016.
2) **Technical Communication** by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2018.
3) **Practical English Usage** by Michael Swan, Oxford University Press – 2016.
4) **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd – 2015.
5) **Effective Technical Communication** – Second Edition by M. Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.

ADVANCED CALCULUS AND NUMERICAL METHODS

Semester	**: II**	**CIE Marks**	**: 40**
Course Code	**: 18MAT21**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 3:2:0**	**Exam Hours**	**: 03**
	Credits : 04		

Course Learning Objectives: This course viz., Advanced Calculus and Numerical Methods (**18MAT21**) aims to prepare the students:

- To familiarize the important tools of vector calculus, ordinary/partial differential equations and power series required to analyze the engineering problems.
- To apply the knowledge of interpolation/extrapolation and numerical integration technique whenever analytical methods fail or very complicated, to offer solutions.

MODULE-I

Vector Calculus:-

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

Vector Integration: Line integrals, Theorems of Green, Gauss and Stokes (without proof). Applications to work done by a force and flux.

(RBT Levels : L1 & L2)

MODULE-II

Differential Equations of higher order:- Second order linear ODE's with constant coefficients-Inverse differential operators, method of variation of parameters; Cauchy's and Legendre homogeneous equations. Applications to oscillations of a spring and L-C-R circuits.

(RBT Levels : L1, L2 & L3)

MODULE-III

Partial Differential Equations(PDE's):- Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one dimensional heat and wave equations and solutions by the method of separation of variables. **(RBT Levels : L1, L2 & L3)**

MODULE-IV

Infinite Series:- Series of positive terms- convergence and divergence. Cauchy's root test and D'Alembert's ratio test(without proof)- Illustrative examples.

Power Series solutions:- Series solution of Bessel's differential equation leading to *Jn(x)*- Bessel's function of first kind-orthogonality. Series solution of Legendre's differential equation leading to *Pn(x)*-Legendre polynomials. Rodrigue's formula (without proof), problems.

(RBT Levels : L1 & L2)

MODULE-V

Numerical Methods:

Finite differences. Interpolation/extrapolation using Newton's forward and backward difference formulae, Newton's divided difference and Lagrange's formulae (All formulae without proof). Solution of polynomial and transcendental equations – Newton-Raphson and Regula-Falsi methods(only formulae)- Illustrative examples.

Numerical integration: Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules, Weddle's rule (without proof) –Problems. **(RBT Levels : L1, L2 & L3)**

Textbooks:

1. **B.S. Grewal:** Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. **E. Kreyszig:** Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. **C.Ray Wylie, Louis C.Barrett :** "Advanced Engineering Mathematics", 6th Edition, 2. McGraw-Hill Book Co., New York, 1995.
2. **James Stewart :** "Calculus –Early Transcendentals", Cengage Learning India Private Ltd., 2017.
3. **B.V.Ramana:** "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
4. **Srimanta Pal & Subobh C Bhunia:** "Engineering Mathematics", Oxford University Press, 3rd Reprint, 2016.
5. **Gupta C.B., Singh S.R. and Mukesh Kumar:** "Engineering Mathematics for Semester I & II", Mc-Graw Hill Education (India) Pvt.Ltd., 2015.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU EDUSAT PROGRAMME - 20

Course Outcomes: On completion of this course, students are able to:

CO1 : Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.

CO2 : Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.

Co3 : Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.

CO4 : Explain the applications of infinite series and obtain series solution of ordinary differential equations.

Co5 : Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.

Question Paper Pattern:

- **The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 60.**
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

ENGINEERING CHEMISTRY

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18CHE12/22**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 3:2:0**	**Exam Hours**	**: 03**
	Credits : 04		

Course Learning Objectives:

This course **(18CHE12/22)** will enable students to

- Master the basic knowledge of engineering chemistry for building technical competence in industries, research and development.
- To develop knowledge in the fields of use of free energy in chemical equilibrium, electrochemistry and energy storage systems, Corrosion and metal finishing.
- To understand the importance of energy systems, environmental pollution, waste management, water chemistry, Instrumental methods of analysis and Nanomaterials.

MODULE-I

Electrochemistry and Energy storage systems

Use of free energy in chemical equilibria: Thermodynamic functions: Definitions of free energy and entropy. Cell potential, derivation of Nernst equation for single electrode potential, numerical problems on E, E0, and Ecell

Electrochemical energy systems: Reference electrodes: Introduction, construction, working and applications of Calomel electrode. Ion-selective electrode – Definition, construction and principle of Glass electrode and determination of pH using glass electrode. Electrolyte concentration cells, numerical problems

Energy storage systems: Introduction, classification - primary, secondary and reserve batteries. Construction, working and applications of Ni-MH and Li-ion batteries

(RBT Levels: L3)

MODULE-II

Corrosion and Metal finishing

Corrosion: Introduction, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of corrosion product, nature of medium – pH, conductivity and temperature. Types of corrosion - Differential metal and differential aeration - pitting and water line). Corrosion control: Anodizing – Anodizing of aluminium, Cathodic protection - sacrificial anode and impressed current methods, Metal coatings – Galvanization

Metal finishing: Introduction, Technological importance. Electroplating: Introduction, principles governing electroplating-Polarization, decomposition potential and overvoltage. Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of nickel & copper, distinction between electroplating and electroless plating processes

(RBT Levels: L1 & L2)

MODULE-III

Energy Systems

Chemical Fuels: Introduction, classification, definitions of CV, LCV, and HCV, determination of calorific value of solid/liquid fuel using bomb calorimeter, numerical problems. Knocking of petrol engine – Definition, mechanism, ill effects and prevention. Power alcohol, unleaded petrol and biodiesel

Fuel Cells: Introduction, differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 electrolyte, and solid oxide fuel cell (SOFCs)

Solar Energy: Photovoltaic cells- introduction, construction and working of a typical PV cell, Preparation of solar grade silicon by Union Carbide Process/Method. Advantages & disadvantages of PV cells

MODULE - IV

Environmental Pollution and Water Chemistry

Environmental Pollution: Air pollutants: Sources, effects and control of primary air pollutants: Carbon monoxide, Oxides of nitrogen and sulphur, hydrocarbons, Particulate matter, Carbon monoxide, Mercury and Lead. Secondary air pollutant: Ozone, Ozone depletion

Waste Management: Solid waste, e-waste & biomedical waste: Sources, characteristics & disposal methods (Scientific land filling, composting, recycling and reuse)

Water Chemistry: Introduction, sources and impurities of water; boiler feed water, boiler troubles with disadvantages -scale and sludge formation, boiler corrosion (due to dissolved O_2, CO_2 and MgC_{12}). Sources of water pollution, Sewage, Definitions of Biological oxygen demand (BOD) and Chemical Oxygen Demand (COD), determination of COD, numerical problems on COD. Chemical analysis of water: Sulphates (gravimetry) and Fluorides (colorimetry). Sewage treatment: Primary, secondary (activated sludge) and tertiary methods. Softening of water by ion exchange process. Desalination of sea water by reverse osmosis

(RBT Levels: L3)

Module V

Instrumental methods of analysis and Nanomaterials

Instrumental methods of analysis: Theory, Instrumentation and applications of Colorimetry, Flame Photometry, Atomic Absorption Spectroscopy, Potentiometry, Conductometry (Strong acid with a strong base, weak acid with a strong base, mixture of strong acid and a weak acid with a strong base)

Nanomaterials: Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: Top down and bottom up approaches, Synthesis by Sol-gel, precipitation and chemical vapour deposition, Nanoscale materials: Fullerenes, Carbon nanotubes and graphenes – properties and applications

(RBT Levels: L1 & L2)

Course Outcomes: On completion of this course, students will have knowledge in:

CO1 : Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.

CO2 : Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electroless plating.

CO3 : Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.

CO4 : Environmental pollution, waste management and water chemistry.

CO5 : Different techniques of instrumental methods of analysis. Fundamental principles of nano materials.

Question Paper Pattern:

- **The SEE question paper will be set for 100 marks and the marks scored by the student will be proportionately reduced to 60.**
- The question paper will have **ten** full questions carrying equal marks.
- Each full question carries **20** marks.
- There will be **two** full questions (with a **maximum** of **three** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Textbooks:

1. P.C. Jain & Monica Jain. **"Engineering Chemistry"**, Dhanpat Rai Publications, New Delhi (2015- Edition).
2. S. S. Dara, A textbook of Engineering Chemistry, 10th Edition, S Chand & Co., Ltd., New Delhi, 2014.
3. Physical Chemistry, by P. W. Atkins, Oxford Publications (Eighth edition-2006).

Reference books:

1. O.G. Palanna, **"Engineering Chemistry"**, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint (2015- Edition).
2. R.V. Gadag & A. Nityananda Shetty., **"Engineering Chemistry"**, I K International Publishing House Private Ltd. New Delhi (2015- Edition).
3. **"Wiley Engineering Chemistry"**, Wiley India Pvt. Ltd. New Delhi. Second Edition-2013.
4. B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Chemistry for Engineering Students, Subhash Publications, Bengaluru, (2015- Edition).

C PROGRAMMING FOR PROBLEM SOLVING

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18CPS13/23**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 2:2:0**	**Exam Hours**	**: 03**
	Credits : 03		

Course Learning Objectives:

This course **(18CPS13/23)** will enable students to:

- Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
- Implement different programming constructs and decomposition of problems into functions.
- Use and implement data structures like arrays and structures to obtain solutions.
- Define and use of pointers with simple applications.

MODULE-I

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

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

(RBT Levels : L1 & L2)

MODULE 2

Managing Input and output operations. Conditional Branching and Loops. Example programs, Finding roots of a quadratic equation, computation of binomial coefficients, plotting of Pascals triangle.

(RBT Levels : L1 & L2)

MODULE 3

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

(RBT Levels : L1, L2 & L3)

MODULE 4

User Defined Functions and Recursion.

Example programs, Finding Factorial of a positive integers and Fibonacci series.

(RBT Levels : L1, L2 & L3)

MODULE 5

Structure and Pointers, Preprocessor Directives

(RBT Levels : L1, L2 & L3)

Course Outcomes:

The student will be able to :

- Illustrate simple algorithms from the different domains such as mathematics, physics, etc.
- Construct a programming solution to the given problem using C.
- Identify and correct the syntax and logical errors in C programs.
- Modularize the given problem using functions and structures.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

Reference Books:

1. Sumitabha Das, Computer Fundamentals & C Programming, Mc Graw Hill Education.
2. Gary J Bronson, ANSI C Programming, 4th Edition, Ceneage Learning.
3. Dey and Ghosh, Programming in C, 3rd Edition, Oxford University Press.
4. Vikas Gupta: Computer Concepts and C Programming, Dreamtech Press 2013.
5. R S Bichkar, Programming with C, University Press, 2012.
6. V Rajaraman: Computer Programming in C, PHI, 2013.
7. Basavaraj S. Anami, Shanmukhappa A Angadi, Sunilkumar S. Manvi, Computer Concepts and C Programming: A Holistic Approach to Learning C, Seond edition, PHI India, 2010.

BASIC ELECTRONICS

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18ELN14/24**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 2:2:0**	**Exam Hours**	**: 03**
	Credits : 03		

Course Objectives:

This course will enable students to:

- Understand characteristics, operation and applications of the diodes, bipolar junction transistors, field effect transistors, SCRs and operational amplifiers in electronic circuits.
- Understand different number systems and working of fundamental building blocks of digital circuits.
- Understand the principle of basic communication system and mobile phones.

MODULE-1

Semiconductor Diodes and Applications:

p-n junction diode, Equivalent circuit of diode, Zener Diode, Zener diode as a voltage regulator, Rectification-Half wave rectifier, Full wave rectifier, Bridge rectifier, Capacitor filter circuit (2.2, 2.3, 2.4 of Text 1).

Photo diode, LED, Photo coupler. (2.7.4, 2.7.5, 2.7.6 of Text 1).

78XX series and 7805 Fixed IC voltage regulator (8.4.4 and 8.4.5 of Text 1).

(RBT Levels : L1, L2 & L3)

MODULE-2

FET and SCR:

Introduction, JFET: Construction and operation, JFET Drain Characteristics and Parameters, JFET Transfer Characteristic, Square law expression for I_D, Input resistance, MOSFET: Depletion and Enhancement type MOSFET-Construction, Operation, Characteristics and Symbols, (refer 7.1, 7.2, 7.4, 7.5 of Text 2), CMOS (4.5 of Text 1).

Silicon Controlled Rectifier (SCR) – Two-transistor model, Switching action, Characteristics, Phase control application (refer 3.4 upto 3.4.5 of Text 1).

(RBT Levels : L1, L2 & L3)

MODULE-3

Operational Amplifiers and Applications:

Introduction to Op-Amp, Op-Amp Input Modes, Op-Amp Parameters-CMRR, Input Offset Voltage and Current, Input Bias Current, Input and Output Impedance, Slew Rate (12.1, 12.2 of Text 2).

Applications of Op-Amp - Inverting amplifier, Non-Inverting amplifier, Summer, Voltage follower, Integrator, Differentiator, Comparator (6.2 of Text 1).

(RBT Levels : L1, L2 & L3)

MODULE-4

BJT Applications, Feedback Amplifiers and Oscillators:

BJT as an amplifier, BJT as a switch, Transistor switch circuit to switch ON/OFF an LED and a lamp in a power circuit using a relay (refer 4.4 and 4.5 of Text 2).
Feedback Amplifiers – Principle, Properties and advantages of Negative Feedback, Types of feedback, Voltage series feedback, Gain stability with feedback (7.1-7.3 of Text 1).
Oscillators – Barkhaunsen's criteria for oscillation, RC Phase Shift oscillator, Wien Bridge oscillator (7.7-7.9 of Text 1).
IC 555 Timer and Astable Oscillator using IC 555 (17.2 and 17.3 of Text 1).

(RBT Levels : L1, L2 & L3)

MODULE-5

Digital Electronics Fundamentals:

Difference between analog and digital signals, Number System-Binary, Hexadecimal, Conversion- Decimal to binary, Hexadecimal to decimal and vice-versa, Boolean algebra, Basic and Universal Gates, Half and Full adder, Multiplexer, Decoder, SR and JK flip-flops, Shift register, 3 bit Ripple Counter (refer 10.1-10.7 of Text 1).
Basic Communication system, Principle of operations of Mobile phone (refer 18.2 and 18.18 of Text 1).

(RBT Levels : L1 & L2)

Course Outcomes:

After studying this course, students will be able to:

- Describe the operation of diodes, BJT, FET and Operational Amplifiers.
- Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.
- Describe general operating principles of SCRs and its application.
- Explain the working and design of Fixed voltage IC regulator using 7805 and Astable oscillator using Timer IC 555.
- Explain the different number system and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops.
- Describe the basic principle of operation of communication system and mobile phones.

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

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

1. +5V power supply unit using Bridge rectifier, Capacitor filter and IC 7805.
2. To switch on/off an LED using a Diode in forward/reverse bias using a battery cell.
3. Transistor switch circuit to operate a relay which switches off/on an LED.
4. IC 741 Integrator circuit/ Comparator circuit.
5. To operate a small loud speaker by generating oscillations using IC 555.

Question paper pattern:

- Examination will be conducted for 100 marks with question paper containing 10 full questions, each of 20 marks.
- Each full question can have a maximum of 4 sub questions.
- There will be 2 full questions from each module covering all the topics of the module.
- Students will have to answer 5 full questions, selecting one full question from each module.
- The total marks will be proportionally reduced to 60 marks as SEE marks is 60.

Textbooks:

1. D.P.Kothari, I.J.Nagarath, "Basic Electronics", 2nd edn, Mc Graw Hill, 2018.
2. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9th edition, 2012.

Reference Books:

1. D.P.Kothari, I.J.Nagarath, "Basic Electronics", 1st edn, Mc Graw Hill, 2014.
2. Boylestad, Nashelskey, "Electronic Devices and Circuit Theory", Pearson Education, 9th Edition, 2007/11th edition, 2013.
3. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008.
4. Muhammad H. Rashid, "Electronics Devices and Circuits", Cengage Learning, 2014.

ELEMENTS OF MECHANICAL ENGINEERING

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18ME15/25**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 2:2:0**	**Exam Hours**	**: 03**
	Credits : 03		

Course Objectives:

This course **(18ME15/25)** will enable students to

CLO1 Learn the fundamental concepts of energy, its sources and conversion.
CLO2 Comprehend the basic concepts of thermodynamics.
CLO3 Understand the concepts of boilers, turbines, pumps, internal combustion engines and refrigeration
CLO4 Distinguish different metal joining techniques.
CLO5 Enumerate the knowledge of working with conventional machine tools, their specifications.

MODULE-1

Sources of Energy : Introduction and application of energy sources like fossil fuels, hydel, solar, wind, nuclear fuels and bio-fuels; environmental issues like global warming and ozone depletion.

Basic concepts of Thermodynamics: Introduction, states, concept of work, heat, temperature; Zeroth, 1st, 2nd and 3rd laws of thermodynamics. Concept of internal energy, enthalpy and entropy (simple numericals).

Steam: Formation of steam and thermodynamic properties of steam (simple numericals).

(RBT : L1, L2 & L3)

MODULE-II

Boilers: Introduction to boilers, classification, Lancashire boiler, Babcock and Wilcox boiler. Introduction to boiler mountings and accessories (no sketches).

Turbines: Hydraulic Turbines – Classification and specification, Principles and operation of Pelton wheel turbine, Francis turbine and Kaplan turbine (elementary treatment only).

Hydraulic Pumps: Introduction, classification and specification of pumps, reciprocating pump and centrifugal pump, concept of cavitation and priming.

(RBT: L1, L2 & L3)

MODULE – III

Internal Combustion Engines

Classification, I.C. Engines parts, 2 and 4 stroke petrol and 4-stroke diesel engines. P-V diagrams of Otto and Diesel cycles. Simple problems on indicated power, brake power, indicated thermal efficiency, brake thermal efficiency, mechanical efficiency and specific fuel consumption.

Refrigeration and Air conditioning

Refrigeration - Definitions - Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, relative COP, Unit of Refrigeration. Refrigerants, Properties of refrigerants, List of commonly used refrigerants. Principle and working of vapor compression refrigeration and vapor absorption refrigeration. Domestic refrigerator. Principles and applications of air conditioners, window and split air conditioners.

(RBT Levels : L1, L2 & L3)

MODULE IV

Properties, Composition and Industrial Applications of engineering materials

Metals – Ferrous: cast iron, tool steels and stainless steels and nonferrous: aluminum, brass, bronze. Polymers - Thermoplastics and thermosetting polymers. Ceramics - Glass, optical fiber glass, cermets. Composites - Fiber reinforced composites, Metal Matrix Composites Smart materials – Piezoelectric materials, shape memory alloys, semiconductors and insulators.

Joining Processes: Soldering, Brazing and Welding

Definitions. Classification and methods of soldering, brazing and welding. Brief description of arc welding, oxy-acetylene welding, TIG welding, and MIG welding.

Belt drives

Open & crossed belt drives, Definitions -slip, creep, velocity ratio, derivations for length of belt in open and crossed belt drive, ratio of tension in flat belt drives, advantages and disadvantages of V belts and timing belts, simple numerical problems.

Gear drives

Types–spur, helical, bevel, worm and rack and pinion. Velocity ratio, advantages and disadvantages over belt drives, simple numerical problems on velocity ratio.

(RBT Levels : L1, L2 & L3)

MODULE-V

Lathe - Principle of working of a center lathe. Parts of a lathe. Operations on lathe - Turning, Facing, Knurling, Thread Cutting, Drilling, Taper turning by Tailstock offset method and Compound slide swiveling method, Specification of Lathe.

Milling Machine - Principle of milling, types of milling machines. Working of horizontal and vertical milling machines. Milling processes - plane milling, end milling, slot milling, angular milling, form milling, straddle milling, and gang milling.

(Layout sketches of the above machines need not be dealt. Sketches need to be used only for explaining the operations performed on the machines)

Introduction to Advanced Manufacturing Systems

Computer Numerical Control (CNC): Introduction, components of CNC, open loop and closed loop systems, advantages of CNC, CNC Machining centers and Turning centers.

Robots: Robot anatomy, joints and links, common robot configurations.

Applications of Robots in material handling, processing and assembly and inspection.

(RBT Levels : L1, L2 & L3)

Course Outcomes:

Upon completion of this course, students will be able to

CO1 Identify different sources of energy and their conversion process.

CO2 Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration.

CO3 Recognize various metal joining processes and power transmission elements.

CO4 Understand the properties of common engineering materials and their applications in engineering industry.

CO5 Discuss the working of conventional machine tools, machining processes, tools and accessories.

CO6 Describe the advanced manufacturing systems.

Question paper pattern:

- **The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 60.**
- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **three** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Note

- To illustrate the concepts of operations of turbines, pumps, conventional machines like lathe, drilling, milling, grinding etc., the instructions should be blended with video presentations and visit to the laboratories/ machine shop concerned.
- Demonstration of soldering, brazing and welding should be arranged in the workshop.
- To illustrate the fundamentals of CNC machining and turning centers and robots, video presentations should be adapted in addition to class room instructions.
- The boiler mountings and accessories should be shown in the engine lab.

- Assignments should be submitted by students on materials, sources of energy, global warming, welding processes, robots and their applications. These assignments should be given due credit in awarding CIE marks.

Textbooks :

1. **Elements of Mechanical Engineering,** K. R. Gopalakrishna, Subhas Publications, Bangalore, 2008.
2. **Elements of Mechanical Engineering,** Vol.-1 & 2, Hajra Choudhury, Media Promoters, New Delhi, 2001.
3. **A Text Book of Elements of Mechanical Engineering",** S. Trymbaka Murthy, 3rd revised edition 2006, I .K. International Publishing House Pvt. Ltd., New Delhi.

Reference Books :

1. **Elements of Mechanical Engineering,** R.K. Rajput, Firewall Media, 2005.
2. **Elements of Mechanical Engineering,** Dr. A. S. Ravindra, Best Publications, 7th edition, 2009.
3. **CAD/CAM/CIM,** Dr. P Radhakrishnan, 3rd edition, New Age International Publishers, New Delhi.
4. **Introduction to Robotics: Mechanics And Control,** Craig, J. J., 2nd Ed.Addison-Wesley Publishing Company, Readong, MA, 1989.
5. **Introduction to Engineering Materials",** B.K. Agrawal ,Tata McGraHill Publication, New Delhi.
6. **Thermal Science and Engineering",** Dr. D.S. Kumar, S.K. Kataria & sons Publication, New Delhi.

ENGINEERING CHEMISTRY LABORATORY

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18CHEL16/26**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 0:0:2**	**Exam Hours**	**: 03**
	Credits : 01		

Course Objectives:

To provide students with practical knowledge of

- Quantitative analysis of materials by classical methods of analysis.
- Instrumental methods for developing experimental skills in building technical competence.

Instrumental Experiments

1. Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2. Conductometric estimation of acid mixture.
3. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
4. Colorimetric estimation of Copper.
5. Determination of pKa of the given weak acid using pH meter.
6. Flame photometric estimation of sodium and potassium.

Volumetric Experiments

1. Estimation of Total hardness of water by EDTA complexometric method.
2. Estimation of CaO in cement solution by rapid EDTA method.
3. Determination of percentage of Copper in brass using standard sodium thiosulphate solution.
4. Determination of COD of waste water.
5. Estimation of Iron in haematite ore solution using standard $K_2Cr_2O_7$ solution by external indicator method.
6. Estimation of percentage of available chlorine in the given sample of bleaching powder (Iodometric method)

Course Outcomes:

On completion of this course, students will have the knowledge in,

CO1: Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.

CO2: Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results.

Conduction of Practical Examination :

1. Examination shall be conducted for 100 marks, later reduced to 60 marks.
2. All experiments are to be included for practical examination.
3. One instrumental and another volumetric experiment shall be set.
4. Different experiments shall be set under instrumental and a common experiment under volumetric.

Reference Books :

1. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, "Vogel's Text Book of Quantitative Chemical Analysis".
2. O.P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age International Publishers.
3. Gary D. Christian, "Analytical chemistry", 6th Edition, Wiley India.

C PROGRAMMING LABORATORY

Semester	**: I/II**	**CIE Marks**	**: 40**
Course Code	**: 18CPL17/27**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 0:0:2**	**Exam Hours**	**: 03**
	Credits : 01		

Course Learning Objectives:

This course **(18CPL17/27)** will enable students to:

- Write flowcharts, algorithms and programs.
- Familiarize the processes of debugging and execution.
- Implement basics of C programming language.
- Illustrate solutions to the laboratory programs.

Descriptions (if any):

- The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm being implemented or implemented for the problems given.
- Note that experiment 1 is mandatory and written in the journal.
- Questions related with experiment 1, need to be asked during viva-voce for all experiments.
- Every experiment should have algorithm and flowchart be written before writing the program.
- Code should be traced using minimum two test cases which should be recorded.
- It is preferred to implement using Linux and GCC.

Laboratory Programs:

1. Familiarization with computer hardware and programming environment, concept of naming the program files, storing, compilation, execution and debugging, taking any simple C- code.

PART A

2. Develop a program to solve simple computational problems using arithmetic expressions and use of each operator leading to simulation of a commercial calculator. (No built-in math function)
3. Develop a program to compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
4. Develop a program to find the reverse of a positive integer and check for palindrome or not. Display appropriate messages.

5. An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
6. Introduce 1D Array manipulation and implement Binary search.
7. Implement using functions to check whether the given number is prime and display appropriate messages. (No built-in math function)

PART B

8. Develop a program to introduce 2D Array manipulation and implement Matrix multiplication and ensure the rules of multiplication are checked.
9. Develop a Program to compute Sin(x) using Taylor series approximation. Compare your result with the built- in Library function. Print both the results with appropriate messages.
10. Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.
11. Develop a program to sort the given set of N numbers using Bubble sort.
12. Develop a 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).
13. Implement structures to read, write and compute average- marks and the students scoring above and below the average marks for a class of N students.
14. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of n real numbers.
15. Implement Recursive functions for Binary to Decimal Conversion.

Laboratory Outcomes:

The student should be able to:

- Write algorithms, flowcharts and program for simple problems.
- Correct syntax and logical errors to execute a program.
- Write iterative and wherever possible recursive programs.
- Demonstrate use of functions, arrays, strings, structures and pointers in problem solving.

Conduct of Practical Examination:

- All laboratory experiments, excluding the first, are to be included for practical examination.
- Experiment distribution
  - o For questions having only one part: Students are allowed to pick one experiment from the lot and are given equal opportunity.

- o For questions having part A and B: Students are allowed to pick one experiment from part A and one experiment from part B and are given equal opportunity.
- Strictly follow the instructions as printed on the cover page of answer script for breakup of marks
- Change of experiment is allowed only once and marks allotted for procedure part to be made zero.
- Marks Distribution (Subjected to change in accordance with university regulations)

a) For questions having only one part – Procedure + Execution + Viva-Voce: 15+70+15 = 100 Marks

b) For questions having part A and B
   i. Part A – Procedure + Execution + Viva = 4 + 21 + 5 = 30 Marks
   ii. Part B – Procedure + Execution + Viva = 10 + 49+ 11 = 70 Marks

TECHNICAL ENGLISH - II

Semester	**: II**	**CIE Marks**	**: 40**
Course Code	**: 18EGH28**	**SEE Marks**	**: 60**
Teaching Hours/week (L:T:P)	**: 0:2:0**	**Exam Hours**	**: 03**
	Credits : 01		

Course Objectives:

The course Technical English – II will enable the students,

- To implement English vocabulary at command and ensure language proficiency
- To Achieve better Technical writing and Presentation skills
- Identify the common errors in speaking and writing English
- Acquire Employment and Workplace communication skills

Language Lab

For augment LSRW and GV skills (Listening, Speaking, Reading, Writing and Grammar, Vocabulary) through tests, activities, exercises etc., comprehensive web-based learning and assessment systems can be referred.

Module - I

Identifying Common Errors in Writing and Speaking English

Subject Verb Agreement (Concord Rules with Exercises), Common errors in Subject-verb agreement, Noun-pronoun agreement, Adjective, Adverb, Verb, Sequence of Tenses, Misplaced modifiers, Articles and Prepositions, Common errors in Conjunctions, Word Order, Errors due to the Confusion of words, Common errors in the use of Idioms and phrases, Gender, Singular & Plural.

(RBT Levels : L1, L2 & L3)

Module - II

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, Redundancies & Clichés.

(RBT Levels : L1, L2 & L3)

Module - III

Technical Reading and Writing Practices

Effective Technical Reading and Writing Practices, Technical Reports writing and Technical Proposals Writing.

Grammar – Voice (Active and Passive Voices) and Reported Speech, Vocabulary – Anologies, Words Confused/Misused, Collocations. The

Listening Comprehension, Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.

(RBT Levels : L1, L2 & L3)

Module - IV

Communication for Employment

Components of a Formal Letter, Formats and Types of Business Letters, Model Letter of Application (Cover Letter) with Resume, Email and Blog Writing, Reading Skills and Reading Comprehension.

(RBT Levels : L1, L2 & L3)

Module - V

Communication at Workplace

Interpersonal Communication Skills, Non-Verbal Communication Skills (Body Language), Group Discussion and Employment Interviews, Presentation skills and Formal Presentations by Students, Dialogues in Various Situations (Practical Sessions by Students).

(RBT Levels : L1, L2 & L3)

Course Outcomes:

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

CO 1: Identify common errors in spoken and written communication
CO 2: Get familiarized with English vocabulary and language proficiency
CO 3: Improve nature and style of sensible writing and acquire employment and workplace communication skills
CO 4: Improve their Technical Communication Skills through Technical Reading and Writing practices
CO 5: Perform well in campus recruitment, engineering and all other general competitive examinations

Question paper pattern :

The SEE question paper will be set for 100 marks and the pattern of the question paper will be objective type (MCQ).

Textbooks :

1. **Technical Communication** by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2018.
2. **Communication Skills** by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018. **Refer it's workbook** for activities and exercises – "Communication Skills – II (A Workbook)" published by Oxford University Press – 2018.

Reference Books :

1. **High School English Grammar & Composition** by Wren and Martin, S Chandh & Company Ltd – 2015.
2. **English Language Communication Skills – Lab Manual cum Workbook,** Cengage learning India Pvt Limited [Latest Revised Edition] – 2018.
3. **Technical Communication** – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
4. **Effective Technical Communication** – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.
5. **Intermediate Grammar, Usage and Composition** by M.L.Tichoo, A.L.Subramanian, P.R.Subramanian, Orient Black Swan – 2016.