



# NEW HORIZON COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC  
Accredited by NAAC with 'A' Grade, Accredited by NBA

The Trust is a Recipient of Prestigious Rajyotsava State Award 2012 Conferred by the Government of Karnataka  
**Awarded Outstanding Technical Education Institute in Karnataka**  
Ring Road, Bellandur Post, Near Marathalli, Bangalore -560 103, INDIA



Academic Year 2019-20

**First and Second Semesters  
Bachelor of Engineering (BE)  
(Common to all Branches)  
Scheme and Syllabus**



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**CREDIT SCHEME FOR I SEMESTER B.E**

<b>FIRST SEMESTER- CHEMISTRY CYCLE</b>											
Sl. No	Course Code	Course	BoS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			CIE	SEE	Total
1	19MAT11	Applied Mathematics-I	BS	2	1	0	3	4	50	50	100
2	19CHE12	Engineering Chemistry	BS	3	0	0	3	3	50	50	100
3	19CSE13	Introduction to Programming with C	CSE	3	0	0	3	3	50	50	100
4	19MEE14	Computer Aided Engineering Drawing	ME	1	0	2	3	5	50	50	100
5	19ECE15	Basic Electronics	ECE	3	0	0	3	3	50	50	100
6	19CHL17	Engineering Chemistry Lab	BS	0	0	2	2	4	25	25	50
7	19CSL18	Programming with C Lab	CSE	0	0	2	2	4	25	25	50
8	19HSS171	Essential English	HSS	Mandatory Course			0	2	25	25	50
9	19HSS172	Constitution of India and Professional Ethics	HSS	Mandatory Course			0	2	25	25	50
<b>Total</b>							<b>19</b>	<b>30</b>	<b>350</b>	<b>350</b>	<b>700</b>

<b>FIRST SEMESTER- PHYSICS CYCLE</b>											
Sl. No	Course Code	Course	BoS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			SEE	CIE	Total
1	19MAT11	Applied Mathematics -I	BS	2	1	0	3	4	50	50	100
2	19PHY12	Engineering Physics	BS	3	0	0	3	3	50	50	100
3	19MEE13	Elements of Mechanical Engineering	ME	3	0	0	3	3	50	50	100
4	19CIV14	Elements of Civil Engineering	CV	3	0	0	3	3	50	50	100
5	19EEE15	Basic Electrical Engineering	EE	3	0	0	3	3	50	50	100
6	19PHL16	Engineering Physics Lab	BS	0	0	2	2	4	25	25	50
7	19EEL17	Basic Electrical Engineering Lab	EE	0	0	2	2	4	25	25	50
8	19HSS171	Essential English	HSS	Mandatory Course			0	2	25	25	50
<b>Total</b>							<b>19</b>	<b>26</b>	<b>325</b>	<b>325</b>	<b>650</b>

**CREDIT SCHEME FOR II SEMESTER BE**

<b>SECOND SEMESTER- CHEMISTRY CYCLE</b>											
Sl. No	Course Code	Course	BoS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			CIE	SEE	Total
1	19MAT21	Applied Mathematics-II	BS	2	1	0	3	4	50	50	100
2	19CHE22	Engineering Chemistry	BS	3	0	0	3	3	50	50	100
3	19CSE23	Introduction to Programming with C	CSE	3	0	0	3	3	50	50	100
4	19MEE24	Computer Aided Engineering Drawing	ME	1	0	2	3	5	50	50	100
5	19ECE25	Basic Electronics	ECE	3	0	0	3	3	50	50	100
6	19CHL27	Engineering Chemistry Lab	BS	0	0	2	2	4	25	25	50
7	19CSL28	Programming with C Lab	CSE	0	0	2	2	4	25	25	50
8	19HSS271	Professional Communication	HSS	2	0	0	2	2	25	25	50
9	19HSS272	Constitution of India and Professional Ethics	HSS	Mandatory Course			0	2	25	25	50
<b>Total</b>							<b>21</b>	<b>30</b>	<b>350</b>	<b>350</b>	<b>700</b>

<b>SECOND SEMESTER- PHYSICS CYCLE</b>											
Sl. No	Course Code	Course	BoS	Credit Distribution			Overall Credits	Contact Hours	Marks		
				L	T	P			SEE	CIE	Total
1	19MAT21	Applied Mathematics -II	BS	2	1	0	3	4	50	50	100
2	19PHY22	Engineering Physics	BS	3	0	0	3	3	50	50	100
3	19MEE23	Elements of Mechanical Engineering	ME	3	0	0	3	3	50	50	100
4	19CIV24	Elements of Civil Engineering	CV	3	0	0	3	3	50	50	100
5	19EEE25	Basic Electrical Engineering	EE	3	0	0	3	3	50	50	100
6	19PHL26	Engineering Physics Lab	BS	0	0	2	2	4	25	25	50
6	19EEL27	Basic Electrical Engineering Lab	EE	0	0	2	2	4	25	25	50
7	19HSS271	Professional Communication	HSS	2	0	0	2	2	25	25	50
<b>Total</b>							<b>21</b>	<b>26</b>	<b>325</b>	<b>325</b>	<b>650</b>

**I YEAR BE SYLLABUS- CHEMISTRY CYCLE**

## APPLIED MATHEMATICS-I

(Common to Chemistry Cycle and Physics Cycle in I Semester)

**Course Code : 19MAT11**

**L: T: P : 2:1:0**

**Exam Hours : 03**

**Credits : 3**

**CIE Marks : 50**

**SEE Marks : 50**

**Course Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Understand the principles of engineering mathematics through calculus.
<b>C02</b>	Calculate the extreme values of a function of two variables.
<b>C03</b>	Apply the concepts of integration of functions of two/three variables over a region.
<b>C04</b>	Develop the ability to construct mathematical models involving differential equations and interpret their solutions physically.
<b>C05</b>	Apply ideas from linear algebra in solving systems of linear equations.
<b>C06</b>	Reduce square matrices to diagonal forms

**Mapping of Course Outcomes to Program Outcomes:**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>C01</b>	3	3	2	2	2	-	-	-	1	1	-	2
<b>C02</b>	3	3	2	2	2	-	-	-	1	1	-	2
<b>C03</b>	3	3	2	2	2	-	-	-	1	1	-	2
<b>C04</b>	3	3	2	2	2	-	-	-	1	1	-	2
<b>C05</b>	3	3	2	2	2	-	-	-	1	1	-	2
<b>C06</b>	3	3	2	2	2	-	-	-	1	1	-	2

### COURSE SYLLABUS

<b>Module No.</b>	<b>CONTENTS OF THE MODULE</b>	<b>Hours</b>	<b>COs</b>
<b>1.</b>	<p><b>Differential Calculus:</b></p> <p><b>Polar Curves:</b> Angle between the radius vector and tangent (Derivation and Problems), angle between two curves (Problems), Pedal equation for polar curves (Problems).</p> <p><b>Curvature and radius of curvature:</b> Cartesian and polar forms (without proof). Centre and Circle of curvature (formulae only)</p> <p><b>Applications:</b> Curvature to evolutes and involutes.</p>	<p><b>9L</b></p> <p><b>+</b></p> <p><b>2T</b></p>	<b>CO1</b>

2.	<b>Partial derivatives:</b> Introduction to partial differentiation, Euler's theorem (Derivation and Problems), Total derivatives, Partial differentiation of composite functions, Jacobian-definition and Problems. <b>Applications:</b> Maxima and Minima of functions of two variables-Problems.	9L + 2T	CO2
3.	<b>Integral Calculus:</b> Problems on Double and triple integrals, evaluation of double integrals by changing the order of integration and changing into polar coordinates. Definitions of Beta and Gamma functions, Relation between beta and gamma functions and simple problems. <b>Applications:</b> Applications of double and triple integrals to find area enclosed by plane curves and volume of sphere and tetrahedron.	9L + 2T	CO3
4.	<b>Ordinary Differential Equations of first order:</b> Solution of first order and first degree differential equations: Problems on Exact, Linear and Bernoulli's differential equations. <b>Applications:</b> Orthogonal Trajectories, Newton's law of cooling, laws of decay and growth-Problems.	9L + 2T	CO4
5.	<b>Linear Algebra:</b> Problems on rank of a matrix by elementary transformations, Solution of system of homogeneous and non-homogeneous linear equations, Gauss-Jordan method, Linear transformation, Eigen values and Eigen vectors of a square matrix, Diagonalisation of a square matrix-Problems.	9L + 2T	CO5 CO6

#### Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10<sup>th</sup> Edition, 2014, ISBN: 978-81-265-5423-2.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43<sup>rd</sup> Edition, 2014, ISBN: 978-81-7409-195-5.

#### Reference Books:

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4<sup>th</sup> Edition, 2015, ISBN: 978-0-273-73409-3
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4<sup>th</sup> Edition, 2016, ISBN: 978-0-07-063419-0.
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28<sup>th</sup> Edition, 2012, ISBN: 81-219-0345-9.
4. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., 9<sup>th</sup> Edition, 2014, ISBN: 978-81-318-0832-0.



**Assessment Pattern:****1. CIE- Continuous Internal Evaluation (50 Marks)**

<b>Bloom's Category</b>	<b>Tests (25 Marks)</b>	<b>Assignment1 (7.5Marks )</b>	<b>Assignment2 (7.5Marks)</b>	<b>Quiz1 (05Marks )</b>	<b>Quiz2 (05Marks )</b>
Remember	5	2.5	2.5	-	-
Understand	5	2.5	2.5	-	-
Apply	10	2.5	2.5	05	05
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

**2. SEE- Semester End Examination (50Marks)**

<b>Bloom's Category</b>	<b>SEE Marks</b>
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

## Engineering Chemistry

Course Code : 19CHE12/22

L: T: P : 3:0:0

Exam Hours : 3hours

Credits : 3

CIE Marks : 50

SEE Marks : 50

**Course Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Understand the basic concepts of electrochemistry and apply the knowledge in designing various electrochemical energy systems.
<b>C02</b>	Understand the corrosion process and its control.
<b>C03</b>	Understand the working principles of various instrumental methods of analysis.
<b>C04</b>	Implement alternative technologies and methods to exploit energy resources in an efficient way.
<b>C05</b>	Understand the chemical aspects of environmental pollution and its remedial measures.
<b>C06</b>	Understand the usage of polymers and nanomaterials in various industries.

### Mapping of Course Outcomes to Program Outcomes:

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
<b>C01</b>	3	2	2	1	-	2	3	-	1	1	-	2
<b>C02</b>	3	2	2	1	-	2	3	-	1	1	-	2
<b>C03</b>	3	2	2	1	-	2	3	-	1	1	-	2
<b>C04</b>	3	2	2	1	-	2	3	-	1	1	-	2
<b>C05</b>	3	2	2	1	-	2	3	-	1	1	-	2
<b>C06</b>	3	2	2	1	-	2	3	-	1	1	-	2

COURSE SYLLABUS			
Module No	CONTENTS OF THE MODULE	Hours	COs
1	<p><b>Electrochemical Energy Systems:</b>  <b>Principles of electrochemistry:</b> Gibb's free energy, EMF, Equilibrium constant, cell notations, Galvanic cell .</p> <p><b>Single electrode</b> –Introduction, origin of single electrode potential ,Nernst equation for single electrode potential-Derivation, problems on single electrode potential and cell potential. Types of electrodes, reference electrodes-construction and working of calomel electrode.</p> <p><b>Ion selective electrodes</b>-construction of glass electrode, derivation of Nernst equation for glass electrode potential(<math>E_G</math>).Determination of pH of a solution using glass electrode</p> <p><b>Concentration cells</b>-construction and working, Nernst equation for cell potential, problems on cell potential</p> <p><b>Batteries:</b> Principal components of a battery, battery characteristics-voltage, capacity, cycle life, shelf life, classification of battery-primary, secondary, reserve batteries. Construction ,working and applications of alkaline battery, secondary Lithium ion battery(LiCoO<sub>2</sub>), recent advances in battery technology (2hrs)</p> <p><b>Fuel cell</b>-Definition, classification, construction, working and application of solid oxide fuel cell(SOFC), recent advances in fuel cell technology</p> <p><b>Super capacitors</b>-Definition, classification, construction, working and application of EDLCs (Electrical double layer super capacitors), advances in super capacitors (1hr)</p>	9	CO1
2	<p><b>Corrosion Science and Metal Finishing; Introduction,</b> Electrochemical theory of corrosion.Types of corrosion –differential metal, differential aeration corrosion (pitting and waterline) and stress corrosion.</p> <p><b>Corrosion control techniques:</b> – protective coatings – metal coatings (Anodic and Cathodic metal coatings taking Galvanization and Tinning as example). Inorganic coatings - Anodizing of aluminum. Cathodic protection by sacrificial anodic method and Impressed voltage method.</p> <p><b>Metal Finishing</b> -Introduction and technological importance. Metal finishing techniques. Electro plating - Gold plating by Alkaline cyanide bath. Electroless plating – Electroless plating of copper and its applications in making PCB, Chemical vapour deposition method</p> <p><b>Instrumental Methods of Chemical Analysis:</b> Methods of chemical analysis - Qualitative and Quantitative, Advantages and disadvantages of instrumental methods over the classical methods. Principle, instrumentation and applications of UV- Visible spectrophotometry, conductometry and Flame photometry</p>	9	CO2 &CO3

3	<p><b>Non-renewable and renewable energy Sources</b>  Introduction to chemical fuels, classification. Properties of fuels: Calorific value (GCV and NCV), Density, viscosity, pour point, cloud point, flash point, octane and cetane numbers, Determination of calorific value of fuel using Bomb calorimeter- Numerical problems, Knocking in IC engine and its mechanism , Anti-knocking agents, unleaded petrol, Cracking (FCC) and reformation of petroleum fractions.  <b>Energy Crisis</b>- Global scenario, need of renewable energy sources  <b>Biomass Energy</b>- Introduction- Routes of biomass conversion to energy,  <b>Thermo-chemical Conversion</b>: Pyrolysis - Bio-oil: Introduction, process and applications.  <b>Biochemical Conversion</b>: Biomethanation -Biogas: Introduction, process and applications.  <b>Chemical Conversion</b>: Transesterification - Biodiesel: Introduction, process and applications  <b>Solar Energy</b>- Conversion of solar energy into electrical energy, Construction and working of silicon solar cell and Dye-sensitized solar cell, Advantages and disadvantages of PV cells</p>	9	CO4
4	<p><b>Environmental Chemistry</b>  <b>Chemical aspects of air pollution</b>: Primary, Secondary, minor air pollutants, aerosols and particulate matter. Green house effect and global warming. Chemical capturing of carbon dioxide.    <b>Chemical aspects of soil pollution</b>: Agro chemicals, waste dumps, mining operations. Control and remediation of soil pollution    <b>Chemical aspects of water pollution</b>: Impurities in water, determination of chemical oxygen demand of waste water sample, problems on it. Softening of water by ion exchange method. Desalination of sea water by electro-dialysis. Sewage treatment – Physical and biological. Photo catalytic dye degradation in water by TiO<sub>2</sub> nanoparticles. Removal of heavy metals from industrial waste water.</p>	9	CO5
5	<p><b>Polymers</b>  <b>Introduction to polymers</b>-Types of polymerization- addition and condensation polymerization.  <b>Glass transition temperature - Definition</b>, Factors influencing T<sub>g</sub>-Flexibility, intermolecular forces, molecular mass. Significance of T<sub>g</sub>.  <b>Important commercial and engineering plastics</b>: Synthesis, properties and applications of Poly propylene, <u>Polytetrafluoroethylene</u> (PTFE), Kevlar, Polyetheretherketone (PEEK).  <b>Advanced polymers</b>: Properties and applications of shape memory polymers- polyurethane, biodegradable polymers - polylactic acid, conducting polymers – Polyacetylene , polymer composites.    <b>Nanomaterials</b>: Introduction, Classification based on dimensions (0D, 1D, 2D and 3D), size dependent properties – Catalytic, Thermal and Optical. Bottom up and top down approach of nanomaterial synthesis, Synthesis and applications of copper oxide nanoparticles by co-precipitation method, zinc oxide nanoparticles by solution combustion method and carbon nanotubes (CNTs) by chemical vapor deposition.</p>	9	CO6

### Text Books

1. Chemistry for Engineering Students, B.S. Jaiprakash, R. Venugopal, Shivakumaraiah and Pushpalyengar, Latest Edition, Subhash Publications, Bangalore
2. Engineering Chemistry by VRKulkarni and K. Ramakrishna Reddy, 1<sup>st</sup> Edition, 2016, New Age International Publishers.
3. A Text Book of Engineering Chemistry, Jain and Jain, 16<sup>th</sup> Edition, Dhanpatrai Publications

### Reference Books

1. Corrosion Engineering by M.G. Fontana, Tata McGraw Hill Education Pvt. Ltd. New Delhi.
2. Engineering Chemistry, Wiley India second Edition 2014.
3. Nanochemistry - A Chemical Approach to Nanomaterials by G. A. Ozin and A. C. Arsenault.
4. Polymer Science by V.R. Gowariker, 2011 Edition
5. A textbook of Environmental Chemistry by V. Subramanian, 2017 edition.

### Assessment Pattern

#### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 Marks)	Assignment1 (7.5Marks)	Assignment2 (7.5Marks)	Quiz1 (5Marks)	Quiz2 (5 Marks)
Remember	5			1	1
Understand	10			2	2
Apply	5	4	4	1	1
Analyze	5	3.5	3.5	1	1
Evaluate		-			
Create	-	-			

#### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (50)
Remember	10
Understand	20
Apply	10
Analyze	10

## INTRODUCTION TO PROGRAMMING WITH 'C'

Course Code : 19CSE13/23  
 L: T: P : 3:0:0  
 Exam Hours : 03

Credits : 3  
 CIE Marks : 50  
 SEE Marks : 50

**Course Outcomes:** On completion of the course, student would be able to:

<b>CO1</b>	Understand the fundamental concepts of computer hardware and number systems.
<b>CO2</b>	Apply the basic programming skills of C Language in problem solving.
<b>CO3</b>	Use different data types, decision structures, loops, arrays, strings and functions of C-programming to design a computer program.
<b>CO4</b>	Apply dynamic memory concepts with pointers.
<b>CO5</b>	Apply various algorithms in solving sorting problems.
<b>CO6</b>	Apply linear data structures like Stack, Queues and Trees in organizing and traversing data.

**Mapping of Course Outcomes to Program Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	3	2	2	2	3	3	2	2	-	-	3
<b>CO2</b>	3	3	2	2	2	3	3	2	2	-	-	3
<b>CO3</b>	3	3	2	2	2	3	3	2	2	-	-	3
<b>CO4</b>	3	3	2	2	2	3	3	2	2	-	-	3
<b>CO5</b>	3	3	2	2	2	3	3	2	2	-	-	3
<b>CO6</b>	3	3	2	2	2	3	3	2	2	-	-	3

COURSE SYLLABUS			
Module No	CONTENTS OF MODULE	Hrs	COs
1	<b>Introduction to C Language:</b> Algorithm, Flowchart, Pseudo-code solution to problem, Basic concepts of a C program, Declaration, Assignment & Print statement, Types of operators and expressions, Programming examples and exercise.	6	CO1, CO2
2	<b>Branching and Looping:</b> Two-way selection (if, if- else, nested if- else, cascaded if-else), switch statement, ternary operator? Goto, Loops (For, do- while, while) in C, break and continue, programming examples and exercises.	8	CO2, CO3

3	<p><b>Functions:</b> User defined functions- function definition, function declaration, function call, Formal and actual parameters, Categories of functions, Passing parameters to functions- Pass by value, Pass by reference, Recursion- types of recursion, programming examples and exercises.</p> <p><b>Arrays and Strings: Arrays:</b> Classification of arrays, Storing value in arrays, Using arrays with Functions- passing individual elements of array, passing the whole array, Multidimensional arrays-addition and multiplication of matrices, <b>Searching and Sorting</b>-Linear search, Binary search, Bubble sort, <b>String:</b> Declaring, Initializing, Printing and reading strings, String input and output functions, String handling functions, Arrays of strings, programming examples and Exercises.</p>	12	CO2, CO3, CO5
4	<p><b>Structures and File Management:</b> Basics of structures- structure data types, type definition, accessing structures, Structure operations, Complex structures-nested structures, structures containing arrays, Array of structures, Structures and Functions, <b>File Management:</b> Creating a file, Declaring file pointer variable, Modes of a file, Opening and closing the files, Input and output operations, Programming examples and exercises.</p>	8	CO3, CO4
5	<p><b>Pointers:</b> Pointers concepts, Pointers and functions, Arrays and pointers, address arithmetic, Character pointer and functions, Pointers to pointer, Dynamic allocations methods- malloc(), calloc(), realloc(), free(), Array of pointers</p> <p><b>Introduction to Data Structures:</b> Primitive and non-primitive data types, Definition and applications of Stacks, Queues, Linked Lists and Trees</p>	10	CO4, CO6

#### Text Books:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, 2<sup>nd</sup> Edition, PHI, 2012.
2. "Problem Solving with C", Jacqueline Jones & Keith Harrow, 1<sup>st</sup> Edition, Pearson 2011.

#### Reference Books:

1. "Computer Concepts and C Programming", Vikas Gupta, Dreamtech Press 2013.
2. "Programming with C", R. S. Bichkar, University Press, 2012.
3. "Computer Programming in C", V. Rajaraman, PHI, 2013.

**Assessment Pattern:****CIE- Continuous Internal Evaluation (50 Marks)**

<b>Bloom's Category</b>	<b>Tests</b>	<b>Assignment1</b>	<b>Assignment2</b>	<b>Quiz1</b>	<b>Quiz2</b>
<b>Marks ( out of 50)</b>	<b>25</b>	<b>7.5</b>	<b>7.5</b>	<b>5</b>	<b>5</b>
Remember	2.5	-	-	-	-
Understand	2.5	-	-	-	-
Apply	7.5	4	4	-	-
Analyze	2.5			2.5	2.5
Evaluate	2.5			2.5	2.5
Create	7.5	3.5	3.5	-	-

**SEE – Semester End Examination (50 Marks)**

<b>Bloom's Category</b>	<b>SEE Marks</b>
Remember	5
Understand	5
Apply	15
Analyze	5
Evaluate	5
Create	15



## COMPUTER AIDED ENGINEERING DRAWING

**Course Code** : 19MEE14/24  
**L: T: P** : 1:0:2  
**Exam hours** : 03

**Credits** : 03  
**CIE Marks** : 50  
**SEE Marks** : 50

**COURSE OUTCOMES:** On completion of the course, student would be able to:

<b>C01</b>	Understand dimensioning, conventions and standards related to orthographic projections in different locations.
<b>C02</b>	Solve problems related to the projection of lines and understand the concept of true and apparent length, and inclinations.
<b>C03</b>	Organise, demonstrate and arrange planes in different positions.
<b>C04</b>	Understand the concept of solids and visualize the arrangements in different positions.
<b>C05</b>	Analyse orthographic models and convert it into isometric views.
<b>C06</b>	Create the drawing for the given solid by applying the basic concepts

**Mapping of CO v/s PO:**

<b>Cos</b>	<b>P01</b>	<b>P02</b>	<b>P03</b>	<b>P04</b>	<b>P05</b>	<b>P06</b>	<b>P07</b>	<b>P08</b>	<b>P09</b>	<b>P010</b>	<b>P011</b>	<b>P012</b>
<b>C01</b>	3	3	3	1	1	1	1	1	2	2	2	2
<b>C02</b>	3	3	3	1	1	1	1	1	2	2	2	2
<b>C03</b>	3	3	3	1	1	1	1	1	2	2	2	2
<b>C04</b>	3	3	3	1	1	1	1	1	2	2	2	2
<b>C05</b>	3	3	3	1	1	1	1	1	2	2	2	2
<b>C06</b>	3	3	3	1	1	1	1	1	2	2	2	2

<b>COURSE SYLLABUS</b>			
<b>Module No</b>	<b>CONTENTS OF MODULE</b>	<b>Hrs</b>	<b>COs</b>
1	<p><b>INTRODUCTION:</b> Introduction to Computer Aided Sketching: Introduction, Drawing instruments and their uses, BIS Conventions, Lettering, dimensioning, geometrical constructions and freehand practicing. Introduction to software, commands used for engineering drawing</p> <p><b>PROJECTIONS OF POINTS:</b> Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants.</p>	<b>06</b>	<b>CO1</b>
2	<p><b>PROJECTIONS OF STRAIGHT LINES</b> 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)</p>	<b>06</b>	<b>CO2</b>
3	<p><b>PROJECTIONS OF PLANE SURFACES</b> Introduction, Definitions–projections of plane surfaces– triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates)</p>	<b>08</b>	<b>CO3</b>
4	<p><b>PROJECTIONS OF SOLIDS</b> Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions (No problems on octahedrons and combination solid).</p>	<b>14</b>	<b>CO4</b>
5	<p><b>ISOMETRIC PROJECTIONS (USING ISOMETRIC SCALE ONLY)</b> Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (Maximum of three solids). <b>DEVELOPMENT OF LATERAL SURFACES</b> of right regular prisms, pyramids, cylinders and cones, their frustums and truncations. (No problems on lateral surfaces of trays, tetrahedrons, sphere and transition pieces)</p>	<b>10</b>	<b>CO5&amp;CO6</b>

**TEXT BOOKS:**

- Engineering Drawing** - N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat, ISBN-13: 978-9380358178
- Computer Aided Engineering Drawing** - K. R. Gopalakrishna, Subash Publishers, Bangalore, 2015, ISBN-13: 9789383224204

**REFERENCE BOOKS:**

1. **A Primer on Computer aided Engineering drawing - 2006**, published by VTU, Belgaum.
2. **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.

**CIE- Continuous Internal Evaluation for theory (50 Marks)**

<b>Bloom's Category</b>	<b>Tests</b>	<b>Assignment1</b>	<b>Assignment2</b>	<b>Surprise Test</b>
Marks (out of 50)	<b>25</b>	<b>10</b>	<b>10</b>	<b>5</b>
Remember	2	1	1	0
Understand	6	2	2	1
Apply	6	2	2	1
Analyze	6	2	2	1
Evaluate	2	1	1	1
Create	3	2	2	1

**SEE - Semester End Examination (50 Marks)**

<b>Bloom's Category</b>	<b>SEE Marks</b>
Remember	4
Understand	10
Apply	11
Analyze	11
Evaluate	4
Create	10

**ASSESSMENT METHOD:****CIE:**

1. Three internal tests (each 25 marks) are conducted, average of all the three tests marks will be considered.
2. Submission of drawing sheets/printouts as assignment will carry 20 marks.
3. One written surprise test conducted and evaluated for 5 marks.

**SEE:**

1. One Question for 10 Marks from Module 1- Only Sketching
2. One Question for 10 Marks from Module 2 - Only Sketching
3. One Question for 20 Marks from Module 3 - Only Sketching
4. Two Questions for 40 Marks from Module 4 - Only software drafting (With Choice)
5. One Question for 20 Marks from Module 5 - Only software drafting (With Choice)

## BASIC ELECTRONICS

Course Code : 19ECE15/25  
 L: T: P : 3:0:0  
 Exam Hours : 03

Credits : 03  
 CIE Marks : 50  
 SEE Marks : 50

**Course Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Apply the concepts of Boolean algebra to implement combinational logic circuits.
<b>C02</b>	Understand diode's functioning as a rectifier and Zener diode's functioning as a voltage regulator.
<b>C03</b>	Understand the basic characteristics of BJT and MOSFET.
<b>C04</b>	Demonstrate BJT's voltage-divider's operation as an amplifier.
<b>C05</b>	Describe the characteristics of op-amp and illustrate its various applications.
<b>C06</b>	Understand the applications of Microprocessors and Microcontrollers.

**Mapping of Course Outcomes to Graduate Attributes:**

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
<b>C01</b>	3	3	2	2	1	2	2	2	2	2	2	2
<b>C02</b>	3	3	2	2	1	2	2	2	2	2	2	2
<b>C03</b>	3	3	2	2	1	2	2	2	2	2	2	2
<b>C04</b>	3	3	2	2	1	2	2	2	2	2	2	2
<b>C05</b>	3	3	2	2	1	2	2	2	2	2	2	2
<b>C06</b>	3	3	2	2	1	2	2	2	2	2	2	2

### SYLLABUS

Module No.	Contents of Module	Hrs	COs
1	<b>Semiconductor Diodes and Applications:</b> P-N Junction diode - its principle, characteristics and parameters, Applications: Half-Wave Rectifier, Full Wave Rectifier(Two Diode, Bridge Rectifier), Zener diode as a voltage regulator. <b>Bipolar Junction Transistor:</b> BJT Operation, BJT Voltages and Currents, Common Emitter Characteristics, Numerical examples as applicable.	9	C02,C03
2	<b>BJT Biasing:</b> DC load line, Need for biasing, Voltage divider bias, Numerical examples as applicable. <b>Amplifiers:</b> BJT amplification - BJT as a voltage and current amplifier, voltage gain, current gain, single stage CE amplifier, phase reversal, effect of coupling and bypass capacitors. <b>MOSFET:</b> Introduction to MOSFET theory, Operation and characteristics, Types of MOSFET, Comparison between BJT and MOSFET.	9	C03, C04
3	<b>Operational Amplifier &amp; its Applications:</b> Characteristics (Ideal Op-amp, Practical Op-amp), Inverting and Non-inverting Amplifier, Voltage follower, Summing Amplifier and Subtractor, Numerical examples as		

	applicable. <b>Oscillators:</b> Basic feedback theory, Positive and Negative feedback, Concept of Stability, Introduction to Oscillators, RC phase shift oscillator. <b>Communication System:</b> Principles of Communication System, Need for Modulation, AM and FM Modulation concept, Modulation index, Numerical examples.	9	C05
4	<b>Digital Electronics:</b> Introduction, Number Systems (Decimal, Binary, Hexadecimal, Octal), Conversion from one number system to other, Complement of Binary Numbers, Boolean Algebra Theorems, De Morgan's theorem, Logic gates, Digital Circuits, Algebraic Simplification, NAND and NOR Implementation.	9	C01
5	<b>Building blocks of a Digital system:</b> Half Adder, Full Adder, Encoder, Decoder, Latch, Flip-Flop, Registers.  Introduction to Microprocessors, General operation of Microprocessors, 8085 Microprocessor architecture and working principle.  Introduction to Microcontrollers, 8051 Microcontroller architecture and operation, Comparison between Microprocessors and Microcontrollers.	9	C01, C06

**Text Books:**

1. Electronic Devices and Circuits, David. A. Bell, 5<sup>th</sup> Edition, 2008, Oxford University Press.
2. Digital Logic and Computer Design, M. Morris Mano, 5<sup>th</sup> edition, 2002, PHI.

**Reference Books:**

1. Op-amps and linear integrated circuits, Ramakant A. Gayakwad, 4<sup>th</sup> edition, 2000, Prentice Hall.
2. Electronic communication systems, Wayne Tomasi, 5<sup>th</sup> edition, 2001, Pearson education.
3. Microprocessor Architecture, Programming and Applications with 8085, Ramesh Gaonkar, 6<sup>th</sup> Edition, 2013, Prentice Hall.
4. The 8051 Microcontroller and Embedded Systems using Assembly and C, Muhammad Ali Mazidi, 2<sup>nd</sup> Edition, 2011, Pearson.

## Assessment Pattern

### CIE- Continuous Internal Evaluation (50 Marks)

<b>Bloom's Category</b>	<b>Tests</b>	<b>Assignment1</b>	<b>Assignment2</b>	<b>Quiz1</b>	<b>Quiz2</b>
<b>Marks (out of 50)</b>	<b>25</b>	<b>7.5</b>	<b>7.5</b>	<b>5</b>	<b>5</b>
Remember	10	-	-	-	-
Understand	7.5	-	-	-	-
Apply	5	7.5	7.5	2.5	2.5
Analyze	2.5	-	-	2.5	2.5
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

### SEE- Semester End Examination (50 Marks)

<b>Bloom's Category</b>	<b>Marks(50)</b>
Remember	20
Understand	15
Apply	10
Analyze	5
Evaluate	-
Create	-

## ENGINEERING CHEMISTRY LAB

**Course Code** : 19CHL17/27  
**L: T: P** : 0:0:2  
**Exam Hours** : 03

**Credits** : 2  
**CIE Marks** : 25  
**SEE Marks** : 25

**Course outcomes:** On completion of the course, student would be able to:

<b>CO1</b>	Handle different types of instruments for chemical analysis.
<b>CO2</b>	Perform various types of titrations for quantitative estimation of industrially important materials.
<b>CO3</b>	Collect data in the laboratory, create graphs, compare the data and draw conclusions.
<b>CO4</b>	Apply laboratory practices such as safety, waste management and record keeping for future tasks.

### Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	2	2	1	2	1	-	-	2	2	-	2
<b>CO2</b>	3	2	2	1	2	1	-	-	2	2	-	2
<b>CO3</b>	3	2	2	1	2	1	-	-	2	2	-	2
<b>CO4</b>	3	2	2	1	2	1	-	-	2	2		2

S.No	List of Experiments	COs
<b>PART A</b>		
1.	Estimation of iron in steel by potentiometry.	CO1, CO2, & CO3
2.	Estimation of copper by colorimetry	
3.	Estimation of HCl using standard NaOH by conductometry.	
4.	Estimation of mixture of acids using standard NaOH by conductometry.	
5.	Determination of pKa value of a weak acid using pH meter	
6.	Determination of viscosity coefficient of a given liquid using Ostwald 's viscometer .	
7.	Estimation of potassium by Flame photometry( Demo).	
<b>PART B</b>		
8.	Determination of total hardness of a sample of water by using standard EDTA solution	CO1, CO2, & CO3
9.	Estimation of percentage of calcium oxide in cement solution.	
10.	Estimation of manganese dioxide in pyrolusite ore.	
11.	Determination of chemical oxygen demand (COD) of the given industrial waste water sample	
12.	Determination of total alkalinity of a given sample of water using standard hydrochloric acid	

13.	Determination of percentage of iron in haematite ore External indicator method( Demo)	
14.	Innovative experiment designed by student.	

### Assessment Pattern

#### CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Performance in each lab session	Internal Test/Model Exam
<b>Marks(Out of 25)</b>	<b>15</b>	<b>10</b>
Remember	3	2
Understand	6	4
Apply	3	2
Analyze	3	2
Evaluate		
Create		

#### SEE- Semester End Examination (25 Marks)

Bloom's Category	SEE
<b>Marks</b>	<b>25</b>
Remember	5
Understand	10
Apply	5
Analyze	5
Evaluate	
Create	



## PROGRAMMING WITH 'C' LAB

**Course Code : 19CSL18/28**

**L: T: P : 0:0:2**

**Exam Hours : 03**

**Credits : 2**

**CIE Marks : 25**

**SEE Marks : 25**

**Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Use flowcharts to solve computational problems.
<b>C02</b>	Create and develop algorithms with arithmetic and logical operators.
<b>C03</b>	Analyse and implement an algorithm with data types, decision structures, loops, arrays, strings and functions.
<b>C04</b>	Design and develop algorithms using predefined or user-defined functions to solve problems on sorting, searching and file processing.

### Mapping of Course Outcomes to Program Outcomes:

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>C01</b>	3	3	3	3	2	2	-	2	2	-	-	3
<b>C02</b>	3	3	3	3	2	2	-	2	2	-	-	3
<b>C03</b>	3	3	3	3	2	2	-	2	2	-	-	3
<b>C04</b>	3	3	3	3	2	2	-	2	2	-	-	3

<b>Expt. No</b>	<b>EXPERIMENTS</b>	<b>COs</b>
<b>1</b>	Write a C program to compute roots of quadratic equation $ax^2+bx+c=0$ , where $a$ , $b$ , and $c$ are three coefficients of a quadratic equation are inputs.	<b>C01, C02, C03, C04</b>
<b>2</b>	Design and develop an algorithm to find the <i>reverse</i> of an integer number.	
<b>3</b>	Design and develop an algorithm to check whether given number is PALINDROME or NOT, Implement a C program for the developed algorithm that takes an integer number as input and output the reverse of the same with suitable messages. Ex: Num: 2019, Reverse: 9102, Not a Palindrome.	
<b>4</b>	Design and develop a c program to implement simple calculator using switch case statement.	
<b>5</b>	Draw the flowchart and Write a C Program to compute Sin(x) using Taylor series approximation given by $\text{Sin}(x) = x - (x^3/3!) + (x^5/5!) - (x^7/7!) + \dots$	
<b>6</b>	Develop, implement and execute a C program to search a Number in a list using <i>linear searching</i> Technique.	
<b>7</b>	Develop an algorithm, implement and execute a C program that reads $N$ integer numbers and arrange them in ascending order using <i>Bubble Sort</i> .	
<b>8</b>	Design and develop a C program to read and print a matrix and check whether a given Matrix is a sparse Matrix or not.	
<b>9</b>	Write and execute a C program to display Pascal Triangle using for loop.	

10	<p>a. Write a C program to implements the following string manipulation functions till the user wishes to continue (infinite loop): (i) strcpy() (ii) strlen() (iii) strrev() (iv) strcmp() (v) strcat().</p> <p>b. Read a sentence and print frequency of vowels and total count of consonants.</p>
11	Design and develop a C function <i>RightRotate(x, n)</i> that takes two integers <i>x</i> and <i>n</i> as input and returns value of the integer <i>x</i> rotated to the right by <i>n</i> positions. Assume the integers are unsigned.
12	Draw the flowchart and write a <i>recursive</i> C function to find the factorial of a number, <i>n!</i> , defined by $fact(n)=1$ , if $n=0$ . Otherwise $fact(n) = n * fact(n-1)$ . Using this function, write a C program to compute the binomial coefficient $nCr$ . Tabulate the results for different values of <i>n</i> and <i>r</i> with suitable messages
13	<p>Given two university information files such as "studentname.txt" and "usn.txt" that contains students Name and USN respectively. Write a C program to create a new file called "output.txt" and copy the content of files "studentname.txt" and "usn.txt" into output file in the sequence shown below.</p> <p>Display the contents of output file "output.txt" on to the screen.</p> <p>Student Name            USN Name 1                    USN1 Name 2                    USN2..... ..</p>
14	<p>a. Write a C program to maintain a record of <i>n</i> student details using an array of structures with four fields (Roll number, Name, Marks, and Grade). Assume appropriate data type for each field. Input &amp; Print the members of the structure</p> <p>b. Write a C program to take 2 structures HH:MM:SS as T1 &amp; T2 &amp; display the time difference as structure as T3.</p>
15	Write a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of <i>n</i> real numbers.

### CIE - Continuous Internal Evaluation: (25 Marks)

Bloom's Category	Performance in each lab session	Internal Test/Model Exam
Marks(Out of 25)	15	10
Remember	2.5	
Understand	2.5	
Apply	5	
Analyze	5	
Evaluate		5
Create		5

### SEE - Semester End Examination: (25 Marks)

Blooms Taxonomy	SEE Marks
Marks (Out of 25)	25
Remember	5
Understand	5
Apply	5
Analyze	5
Evaluate	2.5
Create	2.5

## ESSENTIAL ENGLISH

(Common for Chemistry Cycle and Physics Cycle in I Semester)

**Course Code : 19HSS171**

**L: T: P : 0:0:0**

**Exam Hours : 2**

**Credits : 0**

**CIE Marks : 25**

**SEE Marks : 25**

**Course Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Understand the grammatical forms and structures in English
<b>C02</b>	Develop situational vocabulary and apply the same in basic and routine functions.
<b>C03</b>	Analyze short texts and paraphrase them
<b>C04</b>	Generate and expand ideas both in the oral and written forms

**Mapping of Course Outcomes to Program Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>C01</b>	-	-	-	-	-	-	-	-	2	3	1	3
<b>C02</b>	-	-	-	-	-	-	-	-	2	3	1	3
<b>C03</b>	-	-	-	-	-	-	-	-	2	3	1	3
<b>C04</b>	-	-	-	-	-	-	-	-	2	3	1	3

Module No	Module Contents	Hrs	COs
1	<b>Speaking activity</b> Social graces, Greeting, Self-introduction, introducing others Asking for and Giving Information <b>Grammar and Vocabulary in Use:</b> Parts of Speech, Nouns, Pronouns Articles, Asking question. (WH, Aux Verbs)	6	C01,C02
2	<b>Speaking activity</b> Speaking about Routine, Hobbies, Likes and Dislikes <b>Grammar and Vocabulary in Use:</b> Verb= Main / Assistant, Forms of Verbs, Tense: Simple present tense Writing exercises: Subject Verb Agreement , Positive and Negative sentences, Question tags	6	C01,C02
3	<b>Speaking activity</b> Describing People & Things, Describing Actions <b>Grammar and vocabulary in Use :</b> Adjectives, Adverbs, Articles Tense : Continuous Tenses (Present and Past), Preposition	6	C01,C02

4	Reading Comprehension, Sub Skills of Reading Paraphrasing and Summarizing <b>Grammar in use and (situation vocabulary)</b> :Modals, Simple Past tense	6	C03,C04
5	<b>Writing Activity</b> Writing Skills: Expansion of Ideas, Dialogue Writing <b>Grammar in use (situational vocabulary)</b> : Homonyms, Comparing and Contrasting, Common error in English 1	6	C03,C04

#### Text Books:

1. Grammar Practice Activities- Penny Ur, Cambridge University Press
2. Intermediate English Grammar Raymond Murphy Cambridge University Press

#### Reference Books:

1. Grammar & Composition. New Delhi: S. Chand. ISBN 81-219- 2197-X.
2. Wren, P.C.; Martin, H., A Final Course of Grammar & Composition, S Chand.

#### Assessment Pattern:

#### CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Tests	Assignment	Presentation
<b>Marks(out of 25)</b>	<b>10</b>	<b>10</b>	<b>5</b>
Remember	1	-	-
Understand	2	-	-
Apply	3	5	-
Analyze	2	-	-
evaluate	-	-	-
create	2	5	5

#### SEE – Semester End Examination ( 25Marks)

Bloom's Category	SEE Marks
Remember	5
Understand	5
Apply	5
Analyze	5
Evaluate	-
Create	5

## CONSTITUTION OF INDIA & PROFESSIONAL ETHICS

Course Code : 19HSS172/272  
 L: T: P : 0:0:0  
 Exam Hours : 02

Credits : 0  
 CIE Marks : 25  
 SEE Marks : 25

**Course outcomes:** On completion of the course, student would be able to:

<b>CO1</b>	Gain knowledge of the Indian Constitution and be able to solve the legal and societal issues.
<b>CO2</b>	Acquire the knowledge about Amendment, Electoral Process, Fundamental Duties, Central and State Policies.
<b>CO3</b>	Understand Special Provisions in the Indian Constitution and also about the Human Rights Commission.
<b>CO4</b>	Understand Engineering Ethics and Responsibilities.

### Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	-	-	-	-	-	1	-	3	1	-	-	3
<b>CO2</b>	-	-	-	-	-	1	-	3	1	-	-	3
<b>CO3</b>	-	-	-	-	-	1	-	3	1	-	-	3
<b>CO4</b>	-	-	-	-	-	1	-	3	1	-	-	3

### SYLLABUS

Module No	CONTENTS OF THE MODULE	Hours	COs
<b>1</b>	<b>INTRODUCTION TO CONSTITUTION OF INDIA</b> Introduction to Constitution of India. The making and salient features of the constitution. The necessity of the constitution. Preamble to Indian constitution. Fundamental rights and its restrictions and Limitations. Decided case studies. Right to Information Act. Directive principles of state policy.	5	<b>CO1</b>
<b>2</b>	<b>UNION EXECUTIVE</b> President, prime minister, parliament and supreme court of India. Judicial activism and judicial review. Important parliamentary terminology. Center-state relations. Attorney General of India, Comptroller and Auditor General of India. Fundamental Duties.	4	<b>CO2 &amp; CO3</b>

3	<b>STATE EXECUTIVE</b> State Executive- Governor, Chief Minister, State Legislature. High Court and Subordinate Court. Advocate General of the State. Controller and Auditor General of State. Electoral process in India. Amendment procedure. Types of amendments- 42,44, 61,86,73, 74,75,91,94,95, 100,101,118 amendments.	4	<b>CO2 &amp; CO3</b>
4	<b>SPECIAL PROVISION</b> Special provision for SC & ST. Special provision for women, children and backward classes. Emergency provision, citizenship and National Human Rights Commission.	4	<b>CO4</b>
5	<b>SCOPE &amp; AIM OF ENGINEERING ETHICS</b> Scope & aim of engineering ethics. Responsibility of engineers, Impediments to responsibility. Clash of ethics. Risk, safety and liability of Engineers. Trust and reliability in Engineering. IPR (Intellectual Property Right). Corporate Ethics.	5	<b>CO5</b>

**Text Books:**

1. Durga Das Basu: "Introduction to the constitution" 19<sup>th</sup>/20<sup>th</sup> Edn., or 2008, Lexis Nexis; Twentieth edition (2011)
2. Shubham Singles, Charles E. Haries : Constitution of India and Professional Ethics. Latest Edition-2018, Cengage Learning India Private Limited (2019)

**Reference Books:**

1. M. Govindarajan, S. Natarajan, V. S. Senthilkumar, "Engineering Ethics", Prentice Hall India Learning Private Limited (2013)
2. M. V. Pylee, "An Introduction to Constitution of India", Vikas Publishing 2002.
3. Latest Publication of NHRC- Indian Institute of Human Rights, New Delhi.

**ASSESSMENT PATTERN**

**CIE: Continuous Internal Evaluation (25 Marks)**

Bloom's Category	Marks (25)
Remember	15
Understand	05
Apply	05

**SEE- Semester End Examination (25 marks)**

<b>Bloom's Category</b>	<b>Marks(25)</b>
Remember	15
Understand	5
Apply	5

**I YEAR BE SYLLABUS - PHYSICS CYCLE**



## APPLIED MATHEMATICS-II

(Common for Chemistry Cycle and Physics Cycle in II Semester)

Course Code : 19MAT21  
L: T: P : 2 :1:0  
Exam Hours : 03

Credits : 03  
CIE Marks : 50  
SEE Marks : 50

**Course Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Understand linear differential equations and their applications.
<b>C02</b>	Formulate real world problems using partial differential equations.
<b>C03</b>	Understand the concept of vectors as a tool for solving engineering problems.
<b>C04</b>	Describe the tests of infinite series.
<b>C05</b>	Apply the basic concepts of Laplace transforms to physical situations.
<b>C06</b>	Solve initial and boundary value problems using Laplace transform and also find the response of the system using Laplace transform method.

### Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>C01</b>	3	2	2	2	3	-	-	-	1	1	-	2
<b>C02</b>	3	2	2	2	3	-	-	-	1	1	-	2
<b>C03</b>	3	2	2	2	3	-	-	-	1	1	-	2
<b>C04</b>	3	2	2	2	3	-	-	-	1	1	-	2
<b>C05</b>	3	2	2	2	3	-	-	-	1	1	-	2
<b>C06</b>	3	2	2	2	3	-	-	-	1	1	-	2

### COURSE SYLLABUS

Module No.	CONTENTS OF THE MODULE	Hours	COs
1.	<p><b>Linear differential equations of second and higher order:</b> Solution of initial and boundary value problems, Inverse differential operator techniques for the functions-<math>e^{ax}</math>, <math>\sin(ax + b)</math>, <math>\cos(ax + b)</math> and <math>ax^2 + bx + c</math>. Solution of Cauchy's and Legendre's homogeneous linear equations and variation of parameters method.</p> <p><b>Applications:</b> Electrical Circuits-Simple problems.</p>	9L + 2T	CO1
2.	<p><b>Partial Differential equations:</b> Formation of partial differential equation by eliminating arbitrary constants and functions. Solution of Lagrange's partial differential equation, Solution by separation of variables method.</p> <p><b>Applications:</b> Solutions of one-dimensional heat, wave and two-dimensional Laplace equation by separation of variables method.</p>	9L + 2T	CO2

3.	<p><b>Vector Calculus:</b> Gradient, Divergence, Curl-physical significance and problems. Solenoidal and Irrotational vector fields. Vector identities: <math>\text{div}(\text{grad } \phi)</math>, <math>\text{div}(\text{Curl } A)</math>, <math>\text{Curl}(\text{grad } \phi)</math>, <math>\text{div}(\phi A)</math> and <math>\text{curl } (\phi A)</math>.</p> <p><b>Applications:</b> Potential functions, line integral, Problems on Gauss and Greens theorems (without proof and verification) and work done-Problems.</p>	9L + 2T	CO3
4.	<p><b>Infinite Series:</b> Sequences, Series of positive terms, convergence and divergence, comparison tests, D'Alembert's ratio test, Cauchy's root test. Alternating series: Absolute and Conditional convergence-problems.</p>	9L+ 2T	CO4
5.	<p><b>Laplace Transform and Inverse Laplace Transforms:</b></p> <p>Definition and Laplace transforms of standard functions. Properties of Laplace transforms: Shifting properties, <math>t^n f(t)</math>, <math>\frac{f(t)}{t}</math> forms. Periodic functions (without proof), unit-step function-Problems.</p> <p>Inverse Laplace Transform by partial fractions, completing the square method, Problems on Convolution theorem (without proof and verification).</p> <p><b>Applications of Laplace Transform:</b> Solution of linear differential equations.</p>	9L + 2T	CO5 CO6

**Text Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley-India Publishers, 10<sup>th</sup> Edition, 2014, ISBN: 978-81-265-5423-2.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43<sup>rd</sup> Edition, 2014, ISBN: 978-81-7409-195-5.

**Reference Books:**

1. Glyn James, Modern Engineering Mathematics, Prentice Hall, 4<sup>th</sup> Edition, 2015, ISBN: 978-0-273-73409-3
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education (India) Private Limited, 4<sup>th</sup> Edition, 2016, ISBN: 978-0-07-063419-0.
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand & Company Ltd., 28<sup>th</sup> Edition, 2012, ISBN: 81-219-0345-9.
4. N.P. Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications (P) Ltd., 9<sup>th</sup> Edition, 2014, ISBN: 978-81-318-0832-0.

**Assessment Pattern:****3. CIE- Continuous Internal Evaluation (50 Marks).**

<b>Bloom's Category</b>	<b>Tests (25 Marks)</b>	<b>Assignment1 (7.5Marks )</b>	<b>Assignment2 (7.5Marks )</b>	<b>Quiz1 (5Marks )</b>	<b>Quiz2 (5Marks )</b>
Remember	5	2.5	2.5	-	-
Understand	5	2.5	2.5	-	-
Apply	10	2.5	2.5	5	5
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

**4. SEE- Semester End Examination (50Marks).**

<b>Bloom's Category</b>	<b>SEE Marks</b>
Remember	10
Understand	10
Apply	20
Analyze	5
Evaluate	5
Create	-

## ENGINEERING PHYSICS

**Course Code** : 19PHY12/22  
**L: T: P** : 3:0:0  
**Exam Hours** : 03

**Credits** : 03  
**CIE Marks** : 50  
**SEE Marks** : 50

**Course Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Understand the basic concepts of Quantum Mechanics
<b>C02</b>	Understand the basic concepts of dielectric and magnetic materials and their applications.
<b>C03</b>	Apply the fundamental concepts of Lasers and Optical fibers
<b>C04</b>	Comprehend the underlying principles of conducting and semiconducting materials for various applications.
<b>C05</b>	Acquire knowledge on Modern Engineering materials and material characterization techniques as applicable to research.
<b>C06</b>	Acquire the ability to analyze, formulate and solve problems.

**Mapping of Course Outcomes to Program Outcomes:**

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
<b>C01</b>	3	2	-	-	2	1	-	1	2	1	-	1
<b>C02</b>	3	2	-	-	2	1	-	1	2	1	-	1
<b>C03</b>	3	2	-	-	2	1	-	1	2	1	-	1
<b>C04</b>	3	2	-	-	2	1	-	1	2	1	-	1
<b>C05</b>	3	2	-	-	2	1	-	1	2	1	-	1
<b>C06</b>	3	2	-	-	2	1	-	1	2	1	-	1

### COURSE SYLLABUS

Module No.	CONTENTS OF THE MODULE	Hours	Cos
<b>1</b>	<p><b>Quantum Mechanics:</b>                      Introduction, dual nature of light – mention of Black body radiation, &amp; photoelectric effect, dual nature of matter, de-Broglie hypothesis, matter waves and their characteristic properties, concepts of Phase velocity, Group velocity, relation between group velocity and particle velocity, derivation of de-Broglie wavelength from the concept of Group Velocity, Problems.</p> <p>Heisenberg's uncertainty principle - statement, significance, application (non-existence of electron in nucleus), wave function, Physical significance of wave function, setting up of Schrodinger Time Independent wave equation in 1 dimension, Eigen values and Eigen functions, Application - Particle in a box (one dimensional) and free particle, Problems.</p>	<b>9</b>	<b>C01 C06</b>

2	<p><b>Dielectric &amp; Magnetic Properties</b>  Dielectrics, types, Dielectric constant – importance, effect of applied electric field-polarization, types and temperature dependence of polarization, Polarizability, Internal field (Expression for One dimensional solid), Clausius -Mossotti equation (Derivation), Dielectric loss, expression for tangent loss (<math>\tan \delta</math>), Dielectric relaxation, frequency dependence of <math>\epsilon_r</math>, application of dielectric materials , Problems.</p> <p>Review of magnetic properties, Classification of Magnetic materials (dia, para, ferro), Ferromagnetic Domain theory, B-H curve, Soft and hard magnetic materials, application of magnetic materials.</p>	9	C02 C06
3	<p><b>Lasers&amp; Fiber Optics</b>  Introduction, comparison of Laser and ordinary light, Interaction of radiation with matter, comparison of Spontaneous and stimulated emission, Einstein's A and B coefficients, expression for energy density at thermal equilibrium, conditions and requisites of Laser, characteristics of laser, Types - Nd:YAG laser, CO2 laser, and their applications, Holography- principle, recording and reconstruction of image , Introduction to LiFi, Problems.</p> <p>Principle and propagation of light in optical fibers, Numerical aperture and Acceptance Angle, Types of optical fibers (material, refractive index, mode), attenuation , Application of optical fibers : Fiber Optical Communication system (Block diagram) and endoscopy, Problems.</p>	9	C03 C06
4	<p><b>Conductors &amp; Semiconductors</b>  Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators based on band theory. Quantum free electron theory, Fermi factor, variation of Fermi factor with Energy at <math>T = 0K</math>, <math>T &gt; 0K</math>, Density of states (qualitative), Fermi dirac distribution (graphical representation), Problems.</p> <p>Introduction of semiconductors , Types ( Purity, band gap), conductivity in an intrinsic semiconductor , derivation for electron concentration in intrinsic semiconductor(<math>N_e</math>) and mention of <math>N_h</math> , expression for intrinsic carrier concentration <math>n_i</math> from Law of mass action, expression for position of Fermi level in Intrinsic semiconductors , graphical discussion of variation of fermi level with temperature and concentration in intrinsic and extrinsic semiconductors, Hall Effect and expression for Hall coefficient in n and p type semiconductors(derivation) -applications of Hall effect, Problems</p>	9	C04 C06
5	<p><b>Modern Engineering Materials &amp; Characterization Techniques</b>  <b>Modern Engineering Materials:</b>  Introduction, Nanomaterials- Introduction, synthesis approach, properties, Applications. Composites – Definition, Classification, Properties and application, Graphene- Introduction, properties and application, Biomaterials: Classification of Biomaterials and its applications.</p> <p><b>Characterization Techniques:</b>  Introduction, importance, XRD- Bragg's Law, derivation, X-ray Diffractometer, Particle size determination. SEM – Principle, Construction, Application and advantages. TEM – Principle, Construction, Application and advantages, Problems.</p>	9	C05 C06

**Text Book**

1. Modern Physics by R Murugesan, KiruthigaSivaprasath, S Chand Publishing, 18<sup>th</sup> ed. 2016
2. Concepts of Modern Physics, Arthur Beiser, 7<sup>th</sup> Edition, 2017, Tata McGrawHill,

**Reference Books**

1. A Textbook of Solid State Physics, S.O. Pillai, 6th Edition, 2010, New Age International
2. Engineering Physics, S.P. Basavaraju, 2018 Edition, SubhasStores
3. Engineering Physics, S. Mani Naidu, 2014, Pearson Publication
4. Engineering Physics, D K Bhattacharya, Poonam Tandon, Oxford university Press, 2015
5. Solid State Physics, C Kittel, 8<sup>th</sup> Edition, 2019, Wiley Indian Edition
6. Engineering Physics, B. K. Pandey and S. Chaturvedi, 1<sup>st</sup> edition, 2012, Cengage Publication

**Assessment Pattern****CIE- Continuous Internal Evaluation (50 Marks)**

Bloom's Category	Tests	Assignment1	Assignment2	Quiz1	Quiz2
<b>Marks (out of 50)</b>	<b>25</b>	<b>7.5</b>	<b>7.5</b>	<b>05</b>	<b>05</b>
Remember	7.5				
Understand	10			02	02
Apply	7.5	7.5	7.5	03	03
Analyze					

**SEE- Semester End Examination (50 Marks)**

Bloom's Category	SEE Marks (50)
Remember	15
Understand	20
Apply	15

## ELEMENTS OF MECHANICAL ENGINEERING

Course Code : 19MEE13/23  
 L: T: P : 3:0:0  
 Exams Hours : 03

Credits : 03  
 CIE Marks : 50  
 SEE Marks : 50

**COURSE OUTCOMES:** On completion of the course, student would be able to:

<b>C01</b>	Estimate the amount of electricity generated through renewable sources of energy.
<b>C02</b>	Evaluate various types of IC engines and effectiveness of engine devices and accessories.
<b>C03</b>	Compute the capacity of power generation and fuel consumption of IC engines and interpret the dimensional design of IC engine components
<b>C04</b>	Understand the function and the working of HVAC and refrigeration systems, and determine their cooling capacity.
<b>C05</b>	Understand production systems using advanced manufacturing systems such as CNC, NTM and Robotics.
<b>C06</b>	Investigate the strength and durability of materials and advanced materials

**Mapping of Course outcomes to Program outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>C01</b>	3	2	1	1	1	1	1	1	2	2	1	2
<b>C02</b>	3	2	1	1	1	1	1	1	2	2	1	2
<b>C03</b>	3	2	1	1	1	1	1	1	2	2	1	2
<b>C04</b>	3	2	1	1	1	1	1	1	2	2	1	2
<b>C05</b>	3	2	1	1	1	1	1	1	2	2	1	2
<b>C06</b>	3	2	1	1	1	1	1	1	2	2	1	2

### Syllabus

<b>SYLLABUS</b>			
Module No	MODULE CONTENTS	Hrs	COs
1	Introduction- Various Energy demands in India. <b>Solar Energy-</b> Types of Solar Energy Utilization, Solar Energy application- Solar Water heater, Space heating of buildings, Solar cooking, Solar in Agriculture. <b>(2 hrs)</b> <b>Wind Power:</b> Utilization of Wind power and hydel power for electric power generation, Installed capacity of hydel and Wind power in India. <b>(1 hr)</b> <b>Bio-diesel a future Technology-</b> Growth in Global Market, advantages, disadvantages, Jatropha biodiesel in India, Process involved in Modern Biodiesel production, Electrical Power generation from Bio-fuels. <b>(3 hrs)</b> <b>Practical session/Practical Case study: (2 hrs)</b> <ul style="list-style-type: none"> <li>• Solar Cooking system in ShirdiSai temple</li> <li>• Solar deployment by MNRE</li> </ul>	08	<b>CO1</b>

	<ul style="list-style-type: none"> <li>• Visit to Roto-Dynamics Lab and understanding working of water turbines</li> </ul> <p><b>Self - assessment:</b></p> <ul style="list-style-type: none"> <li>• Survey on Globally implemented waste-to-energy plant and possibilities in India</li> <li>• Survey on Energy production from Gravity</li> </ul>		
2	<p>Parts of IC Engines, Working of Four stroke petrol and four stroke diesel engine, Working of Two-stroke Engine. Microprocessor based Engine Management system, Battery Ignition system, Anti-lock braking system, Parking Assist systems, Automatic Suspension control, Electric vehicles- EV batteries and drive Motors, Hybrid vehicles and its types, Telematics.</p> <p><b>Practical Case study/Practical Session:(2 hrs)</b></p> <ul style="list-style-type: none"> <li>• Assembly and disassembly of Engine components</li> <li>• Case study GM, Nissan, Ford, Nelco vehicles</li> </ul> <p><b>Self- assessment:</b></p> <ul style="list-style-type: none"> <li>• Mechatronics and its future</li> <li>• Mechatronics in Automotive application</li> </ul>	08	<b>CO2</b>
3	<p>Introduction- IC Engine Terminologies, Definition and Calculation on IP, BP, FP, SFC and various Efficiencies for IC Engine- Problems. Design of IC engine components- Bore and length of cylinder, thickness of cylinder head- Problems, Design considerations while designing Piston, Connecting rod and Crank shaft- Only Theory</p> <p><b>HVAC &amp; R-</b> Modern Refrigerants, Vapour Compression Refrigeration cycle, Domestic Refrigerator. Basic Air cycle, Summer and Winter Air conditioning systems, Psychrometric chart, Parameters to consider while calculating Cooling load and Heating load for building, Split AC unit.</p> <p><b>Practical Session:</b></p> <ul style="list-style-type: none"> <li>• Visit to Energy Conversion Lab- Understanding cut section of Engines, Explaining Calculating various engine parameters (demo)</li> <li>• Visit to Heat transfer Lab- Understanding VCR &amp; AC cycle (demo) and Showing sample calculation for Room heating and cooling load calculation (demo).</li> </ul> <p><b>Self- assessment:</b> Understand HVAC in Car</p>	10	<b>CO3&amp; CO4</b>
4	<p><b>Conventional Machining-</b> Lathe, Drilling and Milling operations- Working Principles</p> <p><b>CNC-</b> Definition, Components of CNC Turning centers and Machining centers, Steps involved in CNC programming, Advantages and disadvantages.</p> <p><b>Robotics-</b> Anatomy of robot. Robot configurations and links, Joint scheme and notation of robot, Sensors used in Robots, Types of End effectors, Application of Robot in Industries.</p> <p><b>NTM-</b> Comparison between conventional and non-conventional machining, Classification, LBM- Sketch, working, advantage, disadvantage and application, WJM- Sketch, working, advantage, disadvantage and application.</p> <p><b>Practical Session:</b></p> <ul style="list-style-type: none"> <li>• Visiting Advanced Manufacturing Lab and understanding the CNC Turning and Machining process</li> <li>• Visiting Machine shop Lab- understanding traditional machining</li> </ul> <p><b>Self- assessment:</b> Identify the benefits of digital manufacturing</p>	9	<b>CO5</b>



5	<p><b>Engineering Materials-</b> Introduction, classification, Stress, Strain and Hooke's Law</p> <p><b>Composites-</b> Introduction, Classification, Metal Matrix composites (MMC) - MMC preparation by Casting process and Powder Metallurgy. Advantages, Disadvantages and Applications of MMC,</p> <p><b>Nano composites-</b> Introduction, Synthesis by Top and Bottom down approach, Advantages, Disadvantages and Applications.</p> <p><b>Rapid Prototyping-</b> Definition, Various RP Techniques, Methodology in RP, Application in various Engineering fields- Medical, Automobile.</p> <p><b>Practical Session:</b></p> <ul style="list-style-type: none"> <li>• Preparation of Composite laminates for Automotive and Aerospace application using different Reinforcement</li> <li>• Testing of Composite materials in Material Testing lab (demo)</li> </ul> <p><b>Self- assessment:</b></p> <p>Study based on Current and future trends of using composites</p>	9	<b>CO6</b>
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### TEXT BOOKS:

#### Module-1

1. G. D. Rai, Non Conventional Energy Sources, Khanna Publishers, Fouth Edition- 2008, ISBN No. 81-7409-073-8
2. Jan C.J. Bart, N Palmeri, Stefano Cavallaro, Biodiesel Science and Technology: From Soil to Oil, CRC Press- Wood head Publishing Limited, 2010, ISBN 978-1-4398-2730-7

#### Module-2

1. K. R. Gopalakrishna, Elements of Mechanical Engineering, Subhas Publications, Bangalore, 2017, ISBN-13: 5551234091781
2. Tom Denton, Automobile Electrical and Electronic systems, ELSEVIER, 3<sup>rd</sup> edition, 2004, ISBN 0 7506 62190

#### Module-3

1. K. R. Gopalakrishna, Elements of Mechanical Engineering, Subhas Publications, Bangalore, 2017, ISBN-13: 5551234091781
2. R S Khurmi and J K Gupta, A Text book Machine Design, EURASIA PUBLISHING HOUSE (PVT.) LTD., 2005
3. P K Ananthanarayanan, Basic Refrigeration and Air conditioning, Tata McGraw Hill Publication, 2005, ISBN 0-07-049500-9
4. Edward G Pita, Air conditioning principles and systems: an energy approach, Prentice Hall, 4<sup>th</sup> edition, ISBN 0-13-092872-0

#### Module-4

1. M. P. Groover , Automation, Production System & Computer Integrated Manufacturing, Person India, 4th Ed, ISBN-13: 978-9332572492
2. Vijay K Jain, Advanced Machining Processes, Allied Publishers Pvt. Limited, 2002, ISBN 81-7764-294-4

#### Module-5

1. Autarkaw, Mechanics of Composite Materials, 2<sup>nd</sup> Edition, CRC Press Published November 2, 2005, ISBN 9780849313431
2. Frank W Liou, Rapid Prototyping and Engineering Applications: A Toolbox for Prototype Development, 2016, ISBN-13: 978-0849334092

## Assessment Pattern

### CIE- Continuous Internal Evaluation for theory (50 Marks)

Bloom's Category Marks (out of 50)	Tests	Assignment1	Assignment2	Quiz1	Quiz2
		25	7.5	7.5	5
Remember	10				
Understand	10	3.5	3.5		
Apply	05	4	4	5	5
Analyze					
Evaluate					
Create					

### SEE - Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	15
Understand	15
Apply	10
Analyze	10
Evaluate	
Create	

## ELEMENTS OF CIVIL ENGINEERING

**Course Code** : 19CIV14 / 19CIV24

**Credits** : 3

**L: T: P** : 3:0:0

**CIE Marks** : 50

**Exam Hours** : 03

**SEE Marks** : 50

**Course Outcomes:** On completion of the course, student would be able to:

<b>CO1</b>	Summarize the scope of Civil Engineering and apply the laws of mechanics to analyze engineering problems
<b>CO2</b>	Apply the concept of moment and couple to solve numerical problems.
<b>CO3</b>	Determine the equilibrium of concurrent and non - concurrent force system.
<b>CO4</b>	Analyze the behavior of ladder, wedge and stationary block under the action of frictional force.
<b>CO5</b>	Identify the position of centroid and compute the moment of inertia of regular cross sections.
<b>CO6</b>	Interpret the relative motion between bodies.

**Mapping of Course Outcomes to Program Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	2	1	1	-	-	-	-	-	-	-	1
<b>CO2</b>	3	2	1	1	-	-	-	-	-	-	-	1
<b>CO3</b>	3	2	1	1	-	-	-	-	-	-	-	1
<b>CO4</b>	3	2	1	1	-	-	-	-	-	-	-	1
<b>CO5</b>	3	2	1	1	-	-	-	-	-	-	-	1
<b>CO6</b>	3	2	1	1	-	-	-	-	-	-	-	1

### SYLLABUS

Module No	Contents of Module	Hrs	Cos
1	<p><b>SCOPE OF CIVIL ENGINEERING</b> Housing, Roads, Bridges and Dams, Basic Introduction of Building Materials – cement, bricks/blocks, aggregate(s), timber, steel, composites, Components of a structure - Substructure, Super structure and Finishes.</p> <p><b>INTRODUCTION TO ENGINEERING MECHANICS</b> Principle of statics, Particle, continuum, Rigid body, Force and its characteristics, Types of forces and classification of force systems, Principle of physical independence of forces, Principle of transmissibility of forces, Principle of superposition of forces, Composition of forces - Definition of Resultant; Composition of coplanar concurrent force system, Parallelogram law of forces, Resolution of forces.</p>	10	CO1

2	<p><b>MOMENT OF A FORCE</b> Couple, Characteristics of couples, Varignon's theorem of moments, Composition of coplanar- non-concurrent force system, Equivalent force - couple system, Numerical problems on composition of coplanar non-concurrent force systems.</p> <p><b>EQUILIBRIUM OF CONCURRENT FORCE SYSTEM</b> Equilibrium of concurrent, parallel and general forces in a plane, equilibrium of three forces in a plane, Definition of equilibrant, Lami's theorem; Resultant and equilibrium of concurrent and parallel forces in space, Numerical problems on equilibrium of coplanar – concurrent and non-concurrent force systems.</p>	8	CO2, CO3
3	<p><b>EQUILIBRIUM OF NON- CONCURRENT FORCE SYSTEM</b> Introduction to beams, Types of loads and supports, Support reactions, statically determinate beams with point load (normal and inclined) and uniformly distributed/varying loads, Numerical problems.</p> <p><b>FRICITION</b> Friction-static friction, Laws of friction, Limiting friction, Angle of friction, angle of repose, Impending motion on horizontal and inclined planes, Ladder and block friction, Numerical problems.</p>	8	CO3, CO4
4	<p><b>CENTROID</b> Centroid of line and area, Centroid of regular figures, Locating the centroid of triangle, semicircle, quadrant of a circle and sector of a circle using method of integration, centroid of composite sections; Numerical problems.</p> <p><b>MOMENT OF INERTIA</b> Second moment of area, polar moment of inertia, Radius of gyration, Perpendicular and Parallel axis theorems, Moment of Inertia of rectangular, circular and triangular areas from method of integration, composite sections, Numerical problems.</p>	9	CO5
5	<p><b>KINETICS-</b> Newton's second law of motion and D'Alemberts principle for rectilinear motion of a particle, Numerical problems.</p> <p><b>KINEMATICS</b> Definitions, Displacement, average velocity Instantaneous velocity Speed- Acceleration - Average acceleration - Variable acceleration, Acceleration due to gravity – Newton's Laws of Motion.</p>	9	CO6

#### TEXT BOOKS

1. Elements of Civil Engineering and Engineering Mechanics by M.N.Shesha Prakash and Ganesh.B.Mogaveer, PHI Learning, 3rdRevisededition(2014)
2. Engineering Mechanics-Statics and Dynamics by A Nelson, Tata McGraw Hill Education Private Ltd, New Delhi, 2009.
3. Elements of Civil Engineering (IV Edition) by S.S.Bhavikatti, New Age International Publisher, New Delhi, 3rd edition 2009

#### REFERENCE BOOKS

1. Engineering Mechanics by S.Timoshenko, D.H.Young, and J.V.Rao, TATA McGraw-Hill Book Company, New Delhi.

2. Beer FP and Johnson ER, "Mechanics for Engineers- Dynamics and Statics"- 3rd SI Metric edition, Tata McGraw Hill. –2008.
3. Shames I H, "Engineering Mechanics–Statics & Dynamics"-PHI–2009.

**CIE Continuous Internal Evaluation (50 Marks)**

<b>Blooms Category</b>	Tests	Assignment1	Assignment2	Quiz 1	Quiz 2
<b>Marks out of 50</b>	25	7.5	7.5	5	5
Remember	2	1	1	1	1
Understand	7	2.5	2.5	2	2
Apply	13	3	3	2	2
Analyze	3	1	1		
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

**SEE-Semester End Examinations (50 Marks)**

<b>Blooms Category</b>	<b>SEE Marks</b>
Remember	10
Understand	10
Apply	20
Analyze	10

## BASIC ELECTRICAL ENGINEERING

**Course Code : 19EEE15/25**

**L: T: P : 3:0:0**

**Exam Hours : 03**

**Credits : 03**

**CIE Marks : 50**

**SEE Marks : 50**

**Course Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Solve DC circuits using simple network reduction methods.
<b>C02</b>	Analyze single phase and three phase systems and compute various parameters.
<b>C03</b>	Select the appropriate energy conversion technique based on the application.
<b>C04</b>	Deploy electrical utilities with appropriate protection and energy saving techniques.
<b>C05</b>	Assess the performance characteristics of measurement systems.
<b>C06</b>	Evaluate and choose the measuring instruments based on the parameters to be measured.

**Mapping of Course Outcomes to Program Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>C01</b>	3	3	-	2	1	-	-	-	-	-	-	-
<b>C02</b>	3	3	-	2	1	-	-	-	-	-	-	-
<b>C03</b>	3	3	-	2	1	-	-	-	-	-	-	-
<b>C04</b>	3	3	-	2	1	-	-	-	-	-	-	-
<b>C05</b>	3	3	-	2	1	-	-	-	-	-	-	-
<b>C06</b>	3	3	-	2	1	-	-	-	-	-	-	-

### SYLLABUS

Module No.	Module Contents	Hours	COs
1	<b>DC Circuits</b> Introduction to Electrical Engineering Concepts of DC circuits–Ohm’s Law–Resistance, Temperature Coefficient of Resistance, Power and Energy–Series and parallel circuits–star/delta conversion–Kirchhoff’s laws	9	CO1
2	<b>AC Circuits</b> <b>Concepts of AC circuits</b> –RMS value, average value, form factor and peak factor–Single phase circuits (R,L,C,RL,RC,RLC)–Power Triangle –power factor <b>Concepts of Three phase circuits</b> –Relation between line and phase quantities in star and delta connected balanced systems–Measurement of Power and Power factor by two wattmeter method	9	CO2
3	<b>Electromagnetic Induction and Energy Conversion</b> Faraday’s Law of Electromagnetic Induction–Self and Mutually induced emfs–Statically induced and dynamically induced emfs–Self and Mutual Inductances–Simple Problems Construction and Working Principle–DC generator and motor–Single Phase Transformer–Synchronous generator–Single phase induction motor–Three phase induction motor	9	CO3

4	<b>Electric Utilities and Protection</b> Different sources of Electrical Energy–Single Line Diagram of Power System– Electrical tariff–Energy audit–Energy Conservation–Basic elements in electrical wiring (Service mains, meter board and Distribution board, Concealed conduit wiring, Two way and Auditorium wiring)– Protection (Fuse & MCB)– Electric Shock and prevention–Earthing ( Pipe & Plate)	9	C04
5	<b>Measurement and Instrumentation</b> Functional elements of measuring instruments–Types of measuring instruments -Standards , Errors and calibration  Principle and types of analog and digital voltmeters, ammeters, multimeters– Single and three phase wattmeters and energy meters – Current and Potential transformers	9	C05, C06

#### Text Books:

1. Metha.V.K, Rohit Metha, “Basic Electrical Engineering”, Fourteenth edition, S.Chand Publishing
2. DC Kulshreshtha, “Basic Electrical Engineering”, TMH, 2009 edition
3. Bhattacharya.S.K, “Basic Electrical and Electronics Engineering”, Pearson Education, 2011
4. J. B. Gupta, “A Course in Electronic and Electrical Measurements”, S. K. Kataria& Sons, Delhi, 2011.

#### Reference Books:

1. Dash.S.S, Subramani.C, Vijayakumar.K, “Basic Electrical Engineering”, Second edition, Vijay Nicole Imprints Pvt. Ltd, 2015
2. P.S. Dhogal, “Basic Electrical Engineering – Vol. I& II”, 42nd Reprint, McGraw-Hill, 2012
3. H. S. Kalsi, “Electronic Instrumentation”, Tata McGraw Hill, Third Edition, 2012
4. J.B.Gupta, “Explanations/Solutions to an Integrated Course in Electrical Engineering”, S. K. Kataria & Sons, 2018.

#### Assessment Pattern

##### CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Test	Assignment-1	Assignment-2	Quiz-1	Quiz-2
<b>Marks(Out of 50)</b>	<b>25</b>	<b>7.5</b>	<b>7.5</b>	<b>5</b>	<b>5</b>
Remember	5	-	-	1	1
Understand	5	-	-	1	1
Apply	10	4	4	2	2
Analyze	5	3.5	3.5	1	1
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

##### SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	-
Create	-

## ENGINEERING PHYSICS LAB

Course Code : 19PHL16/26  
 L:T:P : 0:0:2  
 Exams Hours : 03

Credits : 02  
 CIE Marks : 25  
 SEE Marks : 25

**Course Outcomes:** On completion of the course, student would be able to:

<b>C01</b>	Apply scientific methods and make use of experimental methods to verify theoretical concepts.
<b>C02</b>	Apply analytical techniques and graphical analysis to the experimental data.
<b>C03</b>	Gain practical knowledge by applying the experimental methods to correlate with the theory behind optics, dielectrics, magnetics and conducting and semiconducting materials.
<b>C04</b>	Develop skills required for team work, technical communication and discussions.

**Mapping of Course Outcomes to Program Outcomes:**

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
<b>C01</b>	3	2	2	1	2	1	-	1	2	1	-	1
<b>C02</b>	3	2	2	1	2	1	-	1	2	1	-	1
<b>C03</b>	3	2	2	1	2	1	-	1	2	1	-	1
<b>C04</b>	3	2	2	1	2	1	-	1	2	1	-	1

Exp.No	Experiments	Cos
1	Determination of Planck 's constant usingLED	C01,C02,C03, C04
2	Stefan's Law: To verify Stefan'sLaw	
3	B - H Curve: To draw the B - H curve and to determine the coercivity and retentivity of the given ferromagnetic material	
4	Dielectric constant: To determine the dielectric constant of given dielectric by charge and discharge method	
5	Laser Diffraction : To determine the wavelength of Laser using grating	
6	Numerical Aperture: To determine the numerical aperture of Optical Fiber	
7	Fermi Energy: To determine the Fermi energy of copper.	
8	Zener Diode Characteristics: To study the V-I characteristics of Zener diode and the reverse Zener break down voltage	
9	Photodiode Characteristics: To study the V-I characteristics of photo diode for different light intensity in reverse bias condition	
10	Transistor Characteristics: To study the input and output characteristics of a pnp transistor in CE configuration and find the gain factor.	
11	Energy Gap: To find the energy gap of a given semiconductor.	
12	Hall Effect: To measure Hall Coefficient of materials.(Demonstration)	
13	Resistivity : Four Probe method	
14	Determination of lattice parameters using Powder Diffraction pattern.	

**Note: To perform a minimum of 12 experiments in a semester**



**CIE- Continuous Internal Evaluation (25 Marks)**

<b>Bloom's Category</b>	<b>Performance(day to day)</b>	<b>Internal test</b>
<b>Marks (out of 25)</b>	<b>10</b>	<b>15</b>
Remember	02	02
Understand	03	03
Apply	03	05
Analyze	02	05

**SEE- Semester End Examination (25 Marks)**

<b>Bloom's Category</b>	<b>SEE Marks</b>
Remember	05
Understand	10
Apply	05
Analyze	03
Evaluate	02

## BASIC ELECTRICAL ENGINEERING LAB

**Course Code : 19EEL17/27**

**L: T: P : 0:0:2**

**Exam Hours : 03**

**Credits : 02**

**CIE Marks : 25**

**SEE Marks : 25**

**Course Outcomes:** On completion of the course, student would be able to:

<b>CO1</b>	Verify ohm's law, kirchhoff's laws and determine effective resistance.
<b>CO2</b>	Analyze the behavior of DC motor, three phase induction motor and single phase transformer on load.
<b>CO3</b>	Use appropriate instruments for measurement of various electrical quantities in single phase circuits, and compute three phase power using wattmeters.
<b>CO4</b>	Install appropriate electrical wiring with the selection of protection devices for a residential building.

### Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>	3	3	2	2	1	-	-	-	2	2	-	-
<b>CO2</b>	3	3	2	2	1	-	-	-	2	2	-	-
<b>CO3</b>	3	3	2	2	1	-	-	-	2	2	-	-
<b>CO4</b>	3	3	2	2	1	-	-	-	2	2	-	-

Exp. No.	Experiments	Cos
<b>1</b>	Verification of Ohm's Law	<b>CO1</b>
<b>2</b>	Verification of Kirchhoff's laws	
<b>3</b>	Determination of equivalent resistance using Series-Parallel combination	
<b>4</b>	Determination of equivalent resistance using Star-Delta transformation	
<b>5</b>	Speed Control of DC Shunt Motor	<b>CO2</b>
<b>6</b>	Load Test on DC Shunt Motor	
<b>7</b>	Speed control of 3 $\phi$ Induction motor using VFD and measurement of F, V & I	
<b>8</b>	Load Test on Single Phase Transformer	
<b>9</b>	Measurements of Electrical Quantities- Voltage, Current, Power and Power Factor in RLC Circuit	<b>CO3</b>
<b>10</b>	Measurement of 3 $\phi$ Power	
<b>11</b>	Residential House Wiring using Switches, Fuse, Indicator and Lamp	
<b>12</b>	Staircase Wiring and Fluorescent Wiring	<b>CO4</b>
<b>13</b>	Study of Circuit Protective Devices (MCB and Fuse)	
<b>14</b>	Study and troubleshooting of Electrical Equipment (Fan, Iron Box and Mixer)	

## Assessment Pattern

### CIE- Continuous Internal Evaluation (25 Marks)

<b>Bloom's Category</b>	<b>Performance(day to day)</b>	<b>Internal Test</b>
<b>Marks(Out of 25)</b>	<b>10</b>	<b>15</b>
Remember	02	02
Understand	03	03
Apply	03	05
Analyze	02	05
Evaluate	-	-
Create	-	-

### SEE- Semester End Examination (25 Marks)

<b>Bloom's Category</b>	<b>SEE Marks</b>
Remember	3
Understand	5
Apply	9
Analyze	8
Evaluate	-
Create	-

**PROFESSIONAL COMMUNICATION**  
(Common for Chemistry Cycle and Physics Cycle in II Semester)

Course Code : 19HSS271

L: T: P : 2:0:0

Exam Hours : 2

Credits : 02

CIE Marks : 25

SEE Marks : 25

**Course Outcomes:** At the end of the course, student would be able to:

<b>C01</b>	Understand the concepts, process and importance of communication
<b>C02</b>	Articulate ideas using appropriate nonverbal cues
<b>C03</b>	Apply suitable vocabulary in specific contexts.
<b>C04</b>	Develop competencies to communicate professionally at the workplace

**Mapping of Course Outcomes to Program Outcomes:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>C01</b>	-	-	-	-	-	-	-	-	2	3	1	3
<b>C02</b>	-	-	-	-	-	-	-	-	2	3	1	3
<b>C03</b>	-	-	-	-	-	-	-	-	2	3	1	3
<b>C04</b>	-	-	-	-	-	-	-	-	2	3	1	3

Module No	Module Contents	Hours	COs
1	<b>Communication Skills:</b> Definition, Types, Purpose and Process of Communication <b>Importance of Listening:</b> Listening vs. Hearing, Traits of a Good Listener Listening sub skills, Listening and Paraphrasing	4	<b>C01,C02 C03,C04</b>
2	<b>Language and Vocabulary:</b> Vocabulary and Context, Thematic vocabulary, Synonyms, Homonyms and Homophones <b>Writing activities:</b> Idioms and Phrases, Descriptivewriting using Simile, Metaphors <b>Grammar:</b> Active & Passive Voice, Cloze Exercises, Sentence Completion Exercises	6	<b>C01,C02 C03,C04</b>
3	<b>Non—verbal communication (Body Language):</b> Kinesics, Occulesics, Paralanguage & Body Language across Cultures <b>Presentation Skills:</b> Organising a speech, Use of Discourse Markers, Use of Cohesive Devices, Fluency Development Activities, Speaking Practice, Group Presentation, Expressing Opinions, Agreeing and Disagreeing	8	<b>C01,C02 C03,C04</b>

4	<b>Speaking Activities:</b> Single Point Debates, Expressing Contra Views, Asking for and Giving Reasons, Inferring information from text, Reporting, Sequencing, Summarizing data from Charts, Graphs, and Tables etc. <b>Grammar:</b> Common Errors in English – 2	6	C01,C02 C03,C04
5	<b>Written Communication:</b> 7Cs of Communication, Difference between Business Communication and General Communication, Business Letter Writing, Different Categories of Business Letters, Email Writing, Paragraph Writing	6	C01,C02 C03,C04

**Text Books:**

1. Basic Business Communication Flatley and Lesikar ,Tata McGraw Hill 10<sup>th</sup> Edition
2. Business Communication P.D. Chaturvedi and MukeshChaturvedi Pearson Education

**Reference Books:**

1. The Skills of Communicating. Bill Scott and Helen Wilkie Jacob Books

**Assessment Pattern:**

**CIE- Continuous Internal Evaluation (25 Marks)**

Bloom's Category	Tests	Assignment	Presentation
<b>Marks(out of 25)</b>	<b>10</b>	<b>10</b>	<b>5</b>
Remember	1	-	-
Understand	2	-	-
Apply	3	5	-
Analyse	2	-	-
evaluate	-	-	-
create	2	5	5

**SEE – Semester End Examination (25 Marks)**

Bloom's Category	SEE Marks
Remember	5
Understand	5
Apply	5
Analyze	-
Evaluate	-
Create	10



