NEW HORIZON COLLEGE OF ENGINEERING

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA
New Horizon Knowlegde Park, Ring Road, Bellandur Post, Near Marathalli, Bangalore - 560103, INDIA

DEPARTMENT OF APPLIED SCIENCES

SCHEME & SYLLABUS OF FIRST YEAR BE

AS PER THE NATIONAL EDUCATION POLICY 2020

(COMMON TO ALL BRANCHES)

ACADEMIC YEAR 2021-22

NEW HORIZON COLLEGE OF ENGINEERING

VISION

To emerge as an institute of eminence in the fields of engineering, technology and management in serving the industry and the nation by empowering students with a high degree of technical, managerial and practical competence.

MISSION

To strengthen the theoretical, practical and ethical dimensions of the learning process by fostering a culture of research and innovation among faculty members and students.

To encourage long-term interaction between the academia and industry through their involvement in the design of the curriculum and its hands-on implementation.

To strengthen and mould students in professional, ethical, social and environmental dimensions by encouraging participation in co-curricular and extracurricular activities.

QUALITY POLICY

To provide educational services of the highest quality both curricular and co-curricular to enable students integrate skills and serve the industry and society equally well at a global level.

VALUES

- Academic Freedom
- Innovation
- Integrity
- Professionalism
- Inclusiveness
- Social Responsibility

DEPARTMENT OF APPLIED SCIENCES

VISION

To build strong and sustainable platform for churning out quality students bearing appreciable conceptual knowledge and engineering mind sets to their respective branch department(s)

MISSION

To develop and nurture dedicated teaching-learning team equipped with strong personality traits towards application driven approach, encompassing all stakeholders

QUALITY POLICY

To provide education services of the highest quality both curricular and co-curricular so that our students can integrate skills and serve industry and society equally well at the Global level.

CONTENTS

CREDIT SCHEME FOR I SEMESTER B.E

CHEMISTRY CYCLE – I SEMESTER												
Sl. No	**Course Code**	**Course**	**BoS**	**Credit Distribution**				**Overall Credits**	**Contact Hours**	**Marks**		
				L	**T**	**P**	**S**			**SEE**	**CIE**	**Total**
1	21MAT11A	Applied Mathematics-I	AS	3	1	0	0	4	5	50	50	100
2	21CHE12A	Engineering Chemistry	AS	3	0	0	0	3	4	50	50	100
3	21CSE13A	Problem solving using Python	CSE	3	0	0	0	3	4	50	50	100
4	21MEE14A	Computer Aided Engineering Drawing	ME	2	0	1	0	3	4	50	50	100
5	21ECE15A	Basic Electronics	ECE	3	0	0	0	3	4	50	50	100
6	21CHL16A	Engineering Chemistry Lab	AS	0	0	1	0	1	3	50	50	100
7	21CSL17A	Problem solving using Python Lab	CSE	0	0	1	0	1	3	50	50	100
8	21AEC11A	Communicative English	HSS	1	0	0	0	1	2	50	50	100
9	21AEC13A	Political Science	HSS	1	0	0	0	1	1	50	50	100
Total								**20**	**30**	**450**	**450**	**900**

PHYSICS CYCLE – I SEMESTER												
Sl. No	**Course Code**	**Course**	**BoS**	**Credit Distribution**				**Overall Credits**	**Contact Hours**	**Marks**		
				L	**T**	**P**	**S**			**SEE**	**CIE**	**Total**
1	21MAT11A	Applied Mathematics -I	AS	3	1	0	0	4	5	50	50	100
2	21PHY12A	Engineering Physics	AS	3	0	0	0	3	4	50	50	100
3	21MEE13A	Elements of Mechanical Engineering	ME	3	0	0	0	3	4	50	50	100
4	21CIV14A	Elements of Civil Engineering	CV	3	0	0	0	3	4	50	50	100
5	21EEE15A	Basic Electrical Engineering	EE	3	0	0	0	3	4	50	50	100
6	21PHL16A	Engineering Physics Lab	AS	0	0	1	0	1	3	50	50	100
7	21EEL17A	Basic Electrical Engineering Lab	EE	0	0	1	0	1	3	50	50	100
8	21AEC11A	Communicative English	HSS	1	0	0	0	1	2	50	50	100
9	21AEC12A	Entrepreneurship Development - I	MBA	1	0	0	0	1	1	50	50	100
Total								**20**	**30**	**450**	**450**	**900**

CREDIT SCHEME FOR II SEMESTER BE

CHEMISTRY CYCLE - II SEMESTER												
Sl. No	**Course Code**	**Course**	**BoS**	**CREDIT DISTRIBUTION**				**Overall Credits**	**Contact Hours**	**Marks**		
				L	**T**	**P**	**S**			**CIE**	**SEE**	**Total**
1	21MAT21A	Applied Mathematics-II	AS	3	1	0	0	4	5	50	50	100
2	21CHE22A	Engineering Chemistry	AS	3	0	0	0	3	4	50	50	100
3	21CSE23A	Problem solving using Python	CSE	3	0	0	0	3	4	50	50	100
4	21MEE24A	Computer Aided Engineering Drawing	ME	2	0	1	0	3	4	50	50	100
5	21ECE25A	Basic Electronics	ECE	3	0	0	0	3	4	50	50	100
6	21CHL26A	Engineering Chemistry Lab	AS	0	0	1	0	1	3	50	50	100
7	21CSL27A	Problem solving using Python Lab	CSE	0	0	1	0	1	3	50	50	100
8	21AEC21A	Professional Writing Skills in English	HSS	1	0	0	0	1	2	50	50	100
9	21AEC23A	Political Science	HSS	1	0	0	0	1	1	50	50	100
Total								**20**	**30**	**450**	**450**	**900**

PHYSICS CYCLE – II SEMESTER												
Sl. No	**Course Code**	**Course**	**BoS**	**Credit Distribution**				**Overall Credits**	**Contact Hours**	**Marks**		
				L	**T**	**P**	**S**			**SEE**	**CIE**	**Total**
1	21MAT21A	Applied Mathematics -II	AS	3	1	0	0	4	5	50	50	100
2	21PHY22A	Engineering Physics	AS	3	0	0	0	3	4	50	50	100
3	21MEE23A	Elements of Mechanical Engineering	ME	3	0	0	0	3	4	50	50	100
4	21CIV24A	Elements of Civil Engineering	CV	3	0	0	0	3	4	50	50	100
5	21EEE25A	Basic Electrical Engineering	EE	3	0	0	0	3	4	50	50	100
6	21PHL26A	Engineering Physics Lab	AS	0	0	1	0	1	3	50	50	100
7	21EEL27A	Basic Electrical Engineering Lab	EE	0	0	1	0	1	3	50	50	100
8	21AEC21A	Professional Writing Skills in English	HSS	1	0	0	0	1	2	50	50	100
9	21AEC22A	Entrepreneurship Development - I	MBA	1	0	0	0	1	1	50	50	100
Total								**20**	**30**	**450**	**450**	**900**

KEY WORDS AND TERMINOLOGIES

OBE	Outcome Based Education (Outcome-Based Education is a **student-centric teaching and learning methodology** in which the course delivery, assessment are planned to achieve stated objectives and outcomes.
BoS	Board of Studies
L: T:P:S	Lecture : Tutorial : Practical : Self study
CIE	Continuous Internal Evaluation
SEE	Semester End Examination
CREDIT	A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture) or two hours of tutorial or two hours practical or two hours self-study per week. Credits of a course are distributed across L:T:P:S
CO	Course outcome (Is a statement that clearly describes what and how much or how well the student will know and be able to do after successfully completing the specified course – the essential knowledge, abilities, and attitudes that constitute the basic learning needed by a graduate of the course.
POs	Programme Outcomes (POs are statements about the knowledge, skills and attitudes (attributes) the graduate of a formal engineering program should have. POs deal with the general aspect of graduation for a particular program, and the competencies and expertise a graduate will possess after completion of the program). (Refer POs defined by NBA)
SGPA	Semester Grade Point Average (The performance of a student in a semester is indicated by a number called SGPA) $$SGPA = \frac{\sum[\text{Course Credits x Grade Points}] \text{ for all the Courses in that semester}}{\sum[\text{Course Credits }] \text{ for all the Courses in that Semester}}$$
CGPA	Cumulative Grade Point Average (which is the sum total of the SGPA's of all semesters or that of an academic year) $$CGPA = \frac{\sum[\text{Course Credits x Grade Points}]\text{for all Courses excluding those with F grades until that semester}}{\sum[\text{Course Credits}]\text{for all Courses excluding those with F grades until that semester}}$$

Program Outcomes as defined by NBA (PO)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

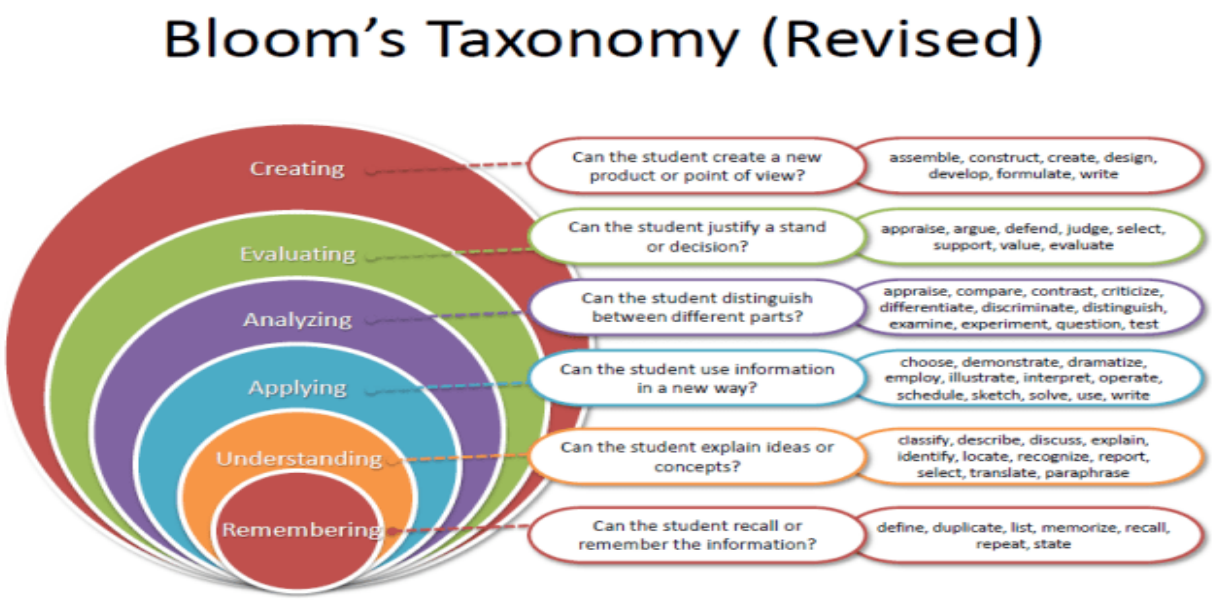
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Grade Points Scales for Absolute Grading							
Level	**Outstanding**	**Excellent**	**Very Good**	**Good**	**Above Average**	**Poor**	**Fail**
Grade	S	A	B	C	D	E	F
Grade Points	10	9	8	7	6	4	0
Score (Marks) Range %	≥90	<90 – ≥ 80	<80 – ≥ 70	<70 – ≥ 60	<60 – ≥ 50	<50 – ≥ 40	<40

RBT	**Revised Blooms Taxonomy Levels** (There are six levels of cognitive learning according to the revised version of Bloom's Taxonomy. Each level is conceptually different. The six levels are **remembering(L1), understanding(L2), applying(L3), analyzing(L4), evaluating(L5), and creating(L6).**



I YEAR BE SYLLABUS- CHEMISTRY CYCLE

APPLIED MATHEMATICS–I
(Common to Physics and Chemistry cycles in the first semester)

Course Code: 21MAT11A **Credits: 04**
L: T: P: S - 3:1:0:0 **CIE Marks: 50**
Exam Hours: 03 **SEE Marks: 50**

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

CO1	Explain the principles of applied mathematics through calculus.
CO2	Apply the concepts of integration of functions on two/three variables over a region.
CO3	Solve the system of linear equations by applying the ideas of linear algebra. Analyze and Simplify square matrices to diagonal forms.
CO4	Determine the extreme values of a function of two variables.
CO5	Develop the ability to construct mathematical models involving differential equations and interpret their solutions physically.

Mapping of Course Outcomes to Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	-	-	-	-	-	-	3	-	3
CO2	3	3	3	3	-	-	-	-	2	3	-	3
CO3	3	3	3	-	-	-	-	-	-	3	-	3
CO4	3	3	3	3	-	-	-	-	-	3	-	3
CO5	3	3	3	3	-	-	-	-	2	3	-	3

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**COs**
1.	**Differential Calculus:** **Polar Curves:** Angle between the radius vector and tangent (Derivation and Problems), angle between two curves (Problems), Pedal equation for polar curves (Problems). **Curvature and radius of curvature:** Cartesian and polar forms (without proof). Centre and Circle of curvature (formulae only) **Applications**: Curvature to evolutes and involutes.	**10**	**CO1**
2.	**Partial derivatives**: Introduction to partial differentiation, Euler's theorem (Derivation and Problems), Total derivatives, Partial differentiation of composite functions, Jacobian-definition and Problems. **Applications:** Maxima and Minima of functions of two variables-Problems.	**10**	**CO4**
3.	**Integral Calculus:** 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. **Applications:** Applications of double and triple integrals to find area enclosed by plane curves and volume of sphere and tetrahedron.	**10**	**CO2**
4.	**Ordinary Differential Equations of first order:** Solution of first-order and first-degree differential equations: Problems on Exact, Linear and Bernoulli's differential equations. **Applications**: Orthogonal Trajectories, Newton's law of cooling, laws of decay and growth-Problems.	**10**	**CO5**
5.	**Linear Algebra:** Problems on rank of a matrix by elementary transformations, Solution of system of homogeneous and non-homogeneous linear equations,		

	Gauss-Jordon method, Linear transformation, Eigen values and Eigen vectors of a square matrix, Diagonalization of a square matrix-Problems. Applications of matrices to Chemical equation and Network flow.	**10**	**CO3**

Text Books:

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

Reference Books:

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

Assessment Matrix:

CIE- Continuous Internal Evaluation (50 Marks).

Bloom's Category	Tests (25 Marks)	Assignment-1 (7.5 Marks)	Assignment-2 (7.5 Marks)	Quiz-1 (05 Marks)	Quiz-2 (05 Marks)
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	-	-	-	-	-

SEE- Semester End Examination (50Marks).

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

ENGINEERING CHEMISTRY

Course Code: 21CHE12A/22A **Credits:3**
L:T:P:S - 3:0:0:0 **CIE Marks:50**
Exam: 03hours **SEE Marks:50**

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

CO1	Explain the chemistry behind engineering materials used in various devices.
CO2	Examine the performance and usage of engineering materials with the knowledge of chemistry.
CO3	Analyze the existing problems and find the solutions with respect to engineering materials, energy production and other natural resources.
CO4	Select the alternative technologies and methods to exploit natural resources in an efficient way.
CO5	Make use of advanced engineering materials in emerging trends.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	-	-	1	2	1	1	1	-	2
CO2	2	2	-	-	-	-	1	-	1	1	-	2
CO3	2	2	1	-	-	2	1	1	1	1	-	2
CO4	2	2	1	-	-	1	1	1	1	1	-	2
CO5	2	2	1	-	-	1	1	1	1	1	-	2

	COURSE SYLLABUS		
Module No	**CONTENTS OF THE MODULE**	**Hours**	**COS**
1	**Electrochemical Energy Systems:** **Principles of electrochemistry**: Gibb's free energy, EMF, Equilibrium constant, cell notations. **Single electrode** –Introduction, origin of single electrode potential, Nernst equation for single electrode Potential-Derivation, problems on single electrode potential and cell potential. Reference electrodes- construction and working of calomel electrode. **Ion selective electrodes**-construction of glass electrode, derivation of Nernst equation for glass electrode potential (EG). Determination of pH of a solution using glass electrode **Concentration cells**-construction and working, Nernst equation for cell potential, problems on cell potential **Batteries:** Principal components of a battery, classification of battery-primary, secondary, reserve batteries. Construction, working and applications of Metal-air battery (Zn- air), secondary Lithium ion battery ($LiCoO_2$). **Fuel cell**-Definition, classification, construction, working and application of solid oxide fuel cell (SOFC)	**9**	CO1 CO2 CO3 CO4 CO5
2	**Corrosion Science and Metal Finishing; Introduction**, Electrochemical theory of corrosion. Types of corrosion –differential metal, differential aeration corrosion (pitting and waterline) and stress corrosion. **Corrosion control techniques**: – 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. **Metal Finishing** -Introduction and technological importance. Metal finishing techniques. Electro plating - Gold plating by Alkaline cyanide bath. Electroless	**9**	CO1 CO2 CO3 CO4

	plating – Electroless plating of copper and its applications in making PCB. **Instrumental Methods of Chemical Analysis:** Methods of chemical analysis- Qualitative and Quantitative, Advantages and disadvantages of instrumental methods over the classical methods. Principle, instrumentation and applications of UV-Visible spectro photometry and conductometry.		CO5
3	**Non-renewable and renewable energy Sources** Introduction to chemical fuels, classification. Properties of fuels: Calorific value (GCV and NCV, 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 (Fluidized catalytic cacking)) and reformation of gasoline. **Biomass Energy**- Introduction- Routes of biomass conversion to energy (Mention all three routes), **Thermo-chemical Conversion**: Pyrolysis - Bio-oil: Introduction, process and applications. **Chemical Conversion:** Transesterification - Biodiesel: Introduction, process and applications. **Solar Energy**- 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	**9**	CO1 CO2 CO3 CO4 CO5
4	**Air and water Chemistry** **Chemical aspects of air pollution**: Primary, Secondary, minor air pollutants, aerosols and particulate matter. Selective catalytic reduction of NOx, Chemical capturing of carbon dioxide, Electro static precipitation technique for the removal of particulate matter and smoke in mining industries. **Chemical aspects of water pollution**: Impurities in water, Hard water and boiler problems due to dissolved oxygen, CO_2 and $MgCl_2$, 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. Reverse osmosis process in water purification. Sewage treatment – Primary, secondary and tertiary treatments. Photo catalytic dye degradation in water by TiO_2 nano particles.	**9**	CO1 CO2 CO3 CO4 CO5
5	**Engineering Materials** **Polymers** Introduction, types of polymerization- addition and condensation with examples. **Glass transition temperature -** Definition**,** Factors influencing Tg- Flexibility, intermolecular forces, molecular mass. Significance of Tg. **Important commercial and engineering plastics**: Synthesis, properties and applications of Polytetra fluoroethylene (PTFE), Kevlar fibre, polyurethane. **Biodegradable polymers** – Importance, Synthesis, properties and applications of polylactic acid. **Conducting polymers** introduction and synthesis of Polyacetylene, Introduction of **Polymer composites.** **Nanomaterials**: Introduction, Classification based on dimensions (0D, 1D, 2D and 3D. Bottom up and top down approach of nano material synthesis,Synthesis and applications of copper oxide nanoparticles by co-precipitation method, zinc oxide nano particles by solution combustion method and carbon nano tubes (CNTs) by chemical vapor deposition. Applications of Nano materials in display systems.	**9**	CO1 CO2 CO3 CO4 CO5

Text Books

1. Chemistry for Engineering Students, B. S. Jaiprakash, R. Venugopal, Shivakumaraiah and PushpaIyengar, Latest Edition, Subhash Publications, Bangalore
2. Engineering Chemistry by V R Kulkarni and K. Ramakrishna Reddy, 1st Edition, 2016, New Age International Publishers.

3. A Text Book of Engineering Chemistry, Jain and Jain, 16th[rd] 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.

Journal references

1. Design of materials for solid oxide fuel cells, permselective membranes, and catalysts for biofuel transformation into syngas and hydrogen based on fundamental studies of their real structure, transport properties, and surface reactivity, Current Opinion in Green and Sustainable Chemistry 2022, 33:100558.
2. Graphene and graphene oxide as new class of materials for corrosion control and protection: Present status and future scenario, Progress in Organic Coatings, Volume 147, October 2020, 105741.
3. Review on dye-sensitized solar cells (DSSCs): Advanced techniques and research trends, Renewable and Sustainable Energy Reviews, Volume 68, Part 1, February 2017, Pages 234-246
4. Photocatalytic degradation of organic pollutants using TiO_2-based photocatalysts: A review, Journal of Cleaner Production 268 (2020) 121725.
5. Production, structural design, functional control, and broad applications of carbon nanofiber-based nanomaterials: A comprehensive review, Chemical Engineering Journal, Volume 402, 15 December 2020, 126189.

Assessment Matrix

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25Marks)	Assignment (5Marks)	Mini Project (10Marks)	Quiz1 (5 Marks)	Quiz2 (5 Marks)
Remember	5			1	1
Understand	10			2	2
Apply	5	3	3	1	1
Analyze	5	2	3	1	1
Evaluate		-	2		
Create	-	-	2		

SEE- Semester End Examination (50 Marks)

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

PROBLEM SOLVING USING PYTHON

Course Code: 21CSE13A/23A **Credits: 3**
L: T: P: S - 3:0:0:0 **CIE Marks: 50**
Exam Hours: 03 **SEE Marks: 50**

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

CO1	Understand the fundamental concepts of Python and Apply the basic programmingskills of Python Language in problem solving.
CO2	Implement Python program using different data types, Control Statement and loops.
CO3	Analyze different strings manipulation functions and user defined functions available inPython.
CO4	Apply List and Tuple concepts to design a Python program.
CO5	Apply set and dictionary concepts of Python Language in problem solving.
CO6	Understand the application of Python programming language in real world problems.

Mapping of Course Outcomes to Program Outcomes:

CO	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	-	-	-	3	-	-	-	3	-	-	-	3	3
CO3	3	3	3	-	3	-	-	-	3	-	-	-	3	3
CO4	3	3	3	-	3	-	-	-	3	-	-	-	3	3
CO5	3	3	3	1	3	-	-	-	3	-	-	-	3	3
CO6	3	3	-	-	-	-	-	-	-	-	-	2	3	3

	COURSE SYLLABUS		
Module No	**CONTENTS OF MODULE**	**Hrs**	**COs**
1	**Basics of Python:** Algorithm and Flowchart, Elements of Python: Keywords, Identifiers, Variables, Data Types, Features, Operators and Expression: AssignmentStatements, Numeric Expressions, Order of Evaluation, Operator Precedence, Type, Type Conversations, Input Output Statement, Comments in Python, Sample Program.	**9**	**CO1**
2	**Loops and Control Statements:** If, elif, Nested if, for, nested for, while, continue, Break, Pass, Sample Programs.	**7**	**CO2**
3	**Strings and Functions:** **Functions:** Advantage of Functions in Python, creating a Function, Function Calling, The return statement, Arguments in function, Built-in Function, Lambda Functions. **Strings:** Creating String in Python, Strings indexing and splitting, Reassigning Strings, Deleting the String, String Operators, Python String functions, Sample Program.	**10**	**CO3**

4	**Data Structures in Python (List and Tuple):** **List:** Creating a List, Characteristics of Lists, List indexing and splitting, Python List Operations, iterating a List, adding elements to the list, Removing elements from the list, Python List Built-in functions. Sample Programs. **Tuple:** Creating a tuple, Tuple indexing and slicing, Negative Indexing, Deleting Tuple, Basic Tuple operations, Python Tuple inbuilt functions, Sample Programs, List vs. Tuple.	**10**	**CO4**
5	**Data Structures in Python (Set & Dictionary):** **Set:** Creating a set, adding items to the set, removing items from the set, remove (), Python Set Operations: Union, Intersection, Difference, Symmetric Difference, Set comparisons, Python Built-in set methods, Sample Programs. **Dictionary:** Creating the dictionary, Properties of Keys and Values, Accessing the dictionary values, adding dictionary values, deleting elements using del keyword, Iterating Dictionary, Built-in Dictionary functions, Sample Programs. Applications of Python.	**9**	**CO5& CO6**

Text Books:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition,Updated for Python 3, Shroff/O' Reilly Publishers, 2016 (http://greenteapress.com/wp/thinkpython/)

2. Guido van Rossum and Fred L. Drake Jr-An Introduction to Python – Revised andupdated for Python 3.2, Network Theory Ltd., 2011.

Reference Books:

1. John V Guttag-Introduction to Computation and Programming Using Python Revised and expanded Edition, MIT Press, 2013

2. Robert Sedgewick, Kevin Wayne, Robert Dondero-Introduction to Programming in Python: An Inter-Disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

ASSESSMENT MATRIX

CIE- Continuous Internal Evaluation (50Marks)

Bloom's Category	Tests (25 Marks)	Assignment (5 marks)	Quiz 1 (05 Marks)	Quiz 2 (05 Marks)	Mini Project (10 Marks)
Remember	5	-	-	-	-
Understand	5	2.5		-	-
Apply	10	2.5	05	05	10
Analyze	2.5	-	-	-	-
Evaluate	2.5	-	-	-	-
Create	-	-	-	-	-

SEE- Semester End Examination(50Marks)

Bloom'sCategory	SEE Marks
Remember	10
Understand	10
Apply	25
Analyze	2.5
Evaluate	2.5
Create	-

COMPUTER AIDED ENGINEERING DRAWING

Course Code	: 21MEE14A/24A	Credits	: 03
L: T: P: S	: 1:0:2:0	CIE marks	: 50
Exam Hours	: 03	SEE marks	: 50

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

CO1	Prepare and understand engineering drawings.
CO2	Analyze orthographic projections of points, lines, planes and solids in different positions using modern CAD/CAE tool.
CO3	Visualize two dimensional drawings and three dimensional objects.
CO4	Apply the concepts of Engineering graphics to prepare real time engineering drawings.

Mapping of CO v/s PO:

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

Course syllabus			
Module No	**Contents of Module**	**Hrs**	**COs**
1	**INTRODUCTION:** 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**PROJECTIONS OF POINTS** Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants. **PROJECTIONS OF STRAIGHT LINES** True and apparent lengths, True and apparent inclinations to reference planes. **PROJECTIONS OF PLANE SURFACES** Introduction, projections of plane surfaces–triangle, square,rectangle, pentagon, hexagon and circle (change of position method only)	12	CO1, CO2
2	**PROJECTIONS OF SOLIDS** Introduction, Projections of right regular tetrahedron, hexahedron, prisms, pyramids, cylinders and cones in different positions.	12	CO1, CO2
3	**ORTHOGRAPHIC PROJECTIONS** Conversion of pictorial views of a simple machine parts into orthographic projections.	08	CO1, CO3

4	**ISOMETRIC PROJECTIONS** Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron, rightregular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids.	08	CO1, CO3
5	**ENGINEERING APPLICATIONS** Sketching and Drawing Simple Mechanisms, Wiring and lighting diagrams using CAD software, basic Building Drawing, Electronic Drawing- PCB Drawings.	04	CO1, CO4

Text Books:

1. Engineering Drawings Vols-1 & 2, K. R. Gopalakrishna, Subhas Stores, Bangalore,2005. ISBN-13-9789383214235
2. Engineering Drawing, N.D. Bhat & V.M. Panchal, 45 Edition, Charotar Publishing,Gujarat, 2005. ISBN-13-9788185594170
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. ISBN-13-9789387788893

Reference Books:

1. French, Thomas E., Vierck, C. J. and Foster, R. J., Fundamental of Engineering Drawing & Graphics Technology, McGraw Hill Book Company (2005). ISBN-13-9780071004251
2. A Textbook of Engineering Graphics by K. Venugopal & Prabhu Raj, New Age International,2009. ISBN-13-9788122424577
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. ISBN-13-9780134808499

Publications of Bureau of Indian Standards

1. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
2. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
3. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

NPTEL/SWAYAM/ MOOC: https://nptel.ac.in/courses/112/103/112103019/

ASSESSMENT MATRIX

CIE -Continuous Internal Evaluation for theory (50 marks)

Bloom's Category	Tests	Assignment 1	Assignment 2	Surprise Test
Marks (out of 50)	25	10	10	5
Remember				
Understand	5	5		2
Apply	10	5	5	3
Analyze	10		5	
Evaluate				
Create				

Semester End Examination (50 marks)

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

BASIC ELECTRONICS

Course Code : 21ECE15A/25A | **Credits : 03**
L: T: P:S : 3:0:0:0 | **CIE Marks : 50**
Exam Hours : 03 | **SEE Marks : 50**

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Understand the operating principle of semiconductor devices and its applications
CO2	Identify the appropriate semiconductor device for real time applications
CO3	Design the basic digital circuits using Boolean Algebra
CO4	Utilize the knowledge of modulation techniques in relating the generations of cellular communication systems
CO5	Apply the knowledge of addressing modes of 8085 Microprocessor to write the basic Assembly Language Programs
CO6	Engage in independent learning as a member of a team, submit a report and use ICT for effective presentation of the study on assigned topics related to electronic systems

Mapping of Course Outcomes to Program Outcomes:

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

SYLLABUS			
Sl no	**Contents of Module**	**Hrs**	**COs**
1	**Semiconductor Diodes and Applications:** P-N Junction diode – its principle, characteristics and parameters Applications: Half-Wave Rectifier, Full Wave Rectifier (Two Diode, Bridge Rectifier), Zener diode as Voltage regulator, Regulated power supply **MOSFET:** Introduction to MOSFET theory, Operation and characteristics of EMOSFET, Application as Inverter.	**9**	**CO1,CO2,CO6**
2	**Bipolar Junction Transistor:** BJT Operation, BJT Voltages and Currents, Common Emitter Characteristics, Numerical examples as applicable. **BJT as an Amplifier:** Biasing - DC load line, Need for biasing, Voltage divider bias– Approximate analysis, Numerical examples as applicable, Single stage CE amplifier, phase reversal, effect of coupling and bypass capacitors. Comparison between BJT and MOSFET.	**9**	**CO1,CO2,CO6**
3	**Digital Electronics:** 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, Algebraic Simplification, Minterms and Maxterms.	**9**	**CO3,CO6**
4	**Communication System:** Introduction to Electronic communication system, Principles of amplitude modulation, Introduction to angle modulation, FM	**9**	**CO4,CO6**

	and PM waveforms, simplified block diagram of a digital radio system, Amplitude shift keying, Frequency shift keying, Phase shift keying Cellular telephone concepts – Evolution of cellular telephone, cellular telephone,1G, 2G cellular telephone systems – GSM, 3G and 4G.		
5	**Building blocks of a Digital system:** Half Adder, Full Adder, Encoder, Decoder, Latch, Flip-Flop, Registers. Introduction to Microprocessors, General operation of Microprocessors, 8085 Microprocessor architecture and working principle, Pin diagram and description, Addressing modes and basic instructions.	**9**	**CO3, CO5,CO6**

Text Books:

1. Electronic Devices and Circuits, David. A. Bell, 5th Edition, 2008, Oxford University Press.
2. Digital Logic and Computer Design, M. Morris Mano, 5th edition, 2002, PHI.
3. Principles of Electronics, V K Mehta, 12th edition, 2020, S. Chand Publishing.

Reference Books:

1. Electronic communication systems, Wayne Tomasi, 5th edition, 2001, Pearson education.
2. Microprocessor Architecture, Programming and Applications with 8085, Ramesh Gaonkar, 6th Edition, 2013, Prentice Hall.

Assessment Matrix

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Tests**	**Assignment**	**Quiz**	**Quiz**	**Mini Project**
Marks (out of 50)	**25**	**5**	**5**	**5**	**10**
Remember	10	-	-	-	-
Understand	10	-	2	2	-
Apply	5	5	3	3	-
Analyze	-	-	-	-	10
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Category	**Tests**
Remember	10
Understand	20
Apply	15
Analyze	5
Evaluate	-
Create	-

ENGINEERING CHEMISTRY LAB

Course Code: 21CHL16A/26A **Credits: 01**
L: T: P: S - 0:0:1:0 **CIE Marks: 50**
Exam Hours: 03 **SEE Marks: 50**

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

CO1	Explain the basic principles of quantitative analysis.
CO2	Demonstrate the various techniques of quantitative analysis used in engineering materials.
CO3	Apply the laboratory practices such as safety, waste management and record keeping for the future tasks.
CO4	Analyze the various parameters with respect to chemistry to decide the quality of materials.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	2	1	1	1	1	1	-	2
CO2	2	2	-	-	2	1	1	1	1	1	-	2
CO3	2	-	-	-		1	1	1	1	1	-	2
CO4	2	2	1	1	2	1	1	1	1	1	-	2

Sl. No.	List of Experiments	COs
	PART A	
1.	Estimation of iron in steel by potentiometry.	CO1,CO2, CO3&CO4
2.	Estimation of copper by colorimetry	
3.	Estimation of mixture of acids using standard NaOH by conductometry.	
4.	Determination of pKa value of a weak acid using pH meter	
5.	Determination of viscosity coefficient of a given liquid using Ostwald ‘s viscometer .	
6.	Estimation of potassium by Flame photometry (Demo).	
	PART B	
7.	Determination of total hardness of a sample of water by using standard EDTA solution	
8.	Estimation of percentage of calcium oxide in cement solution.	
9.	Estimation of manganese dioxide in pyrolusite ore.	
10.	Determination of chemical oxygen demand (COD) of the given industrial waste water sample	
11.	Determination of percentage of iron in haematite ore by External indicator method (Demo)	
12.	Innovative experiment designed by student.	

References

Text Books:

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

Reference books:

1. G.H Jeffery, J Bassett, J Mendham and R.C. Denney Vogel's A.I. A text book of quantitative analysis, Dorling Kindersley (India) Pvt., Ltd. 35th edition, 2012.

2. Gary D Christian, Analytical Chemistry, Wiley India, 6th edition, 2015.

Assessment Matrix

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Performance in each lab session (10 experiments each for 25 marks)**	**Internal Test/Model Exam (50 marks scaled to 20)**	**Lab record (5 marks)**
Marks(Out of 25)	**25**	**20**	**5**
Remember	5	4	
Understand	10	8	
Apply	5	4	5
Analyze	5	4	
Evaluate			
Create			

SEE- Semester End Examination (25 Marks)

Bloom's Category	**SEE**
Marks	**50**
Remember	10
Understand	20
Apply	10
Analyze	10
Evaluate	
Create	

PROBLEM SOLVING USING PYTHON LAB

Course Code: 21CSL17A/27A **Credits: 01**
L: T: P: S - 0:0:1:0 **CIE Marks: 50**
Exam Hours: 03 **SEE Marks: 50**

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Develop algorithms and flowcharts to solve computational problems.
CO2	Apply the basic concepts of branching, looping statements of Python Language in problem solving.
CO3	Create programs by applying the concepts of functions, strings.
CO4	Implement programs using List and Tuple concepts.
CO5	Implement programs using Set and Dictionary
CO6	Implement Searching and Sorting Problem using Python.

Mapping of Course Outcomes to Program Outcomes:

CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2
CO1	3	3	3	3	2	2	-	2	2	-	-	3	-	-
CO2	3	3	3	3	2	2	-	2	2	-	-	3	3	3
CO3	3	3	3	3	2	2	-	2	2	-	-	3	3	3
CO4	3	3	3	3	2	2	-	2	2	-	-	3	3	3
CO5	3	3	3	3	2	2	-	2	2	-	-	3	3	3
CO6	3	3	3	3	2	2	-	2	2	-	-	3	3	3

Exp. No	Experiment	Hours	COs
1	Write a Python Program to do quadratic equations.	3	CO1,CO2
2	Write a Python Program to Multiply two matrixes.	3	CO1,CO2
3	Write a program to find factorial of a number (Recursive and iterative)	3	CO1,CO2
4	Write a Python Program to Check if a string is palindrome or not.	3	CO1,CO3
5	Write a Python Program to calculate value of nCr.	3	CO1,CO3
6	Write a Python Program to Print Pascal Triangles	3	CO1,CO2,CO4
7	Write a Python Program to check whether a given matrix is sparse matrix or not.	3	CO1,CO2,CO4
8	Write a Python Program for Selection Sort	3	CO1,CO4,CO6
9	Write a Python Program for Bubble Sort	3	CO1,CO4,CO6
10	Write a Python Program for Merge Sort	3	CO1,CO4,CO6
11	Write a Python program to count the number of characters	3	CO1,CO3

	(character frequency) in a string.		
12	Write a Python Program to compute Sin(x) using Taylor series approximation given by Sin(x) = x - (x3/3!) + (x5/5!) - (x7/7!) + …….	3	CO1,CO4
13	Illustrate with a python program to show various insert and delete operations in set, tuple, dictionary and list.	3	CO1,CO4,CO5
14	Write a Python Program for Linear Search.	3	CO1,CO6
15	Write a Python Program for Binary Search (Recursive and iterative).	3	CO1,CO6

CIE- Continuous Internal Evaluation (50Marks)

Bloom's Category	**Performance in each lab session (15 experiments each for 25 marks)**	**Internal Test/Model Exam (50 marks scaled to 20)**	**Lab record (5 marks)**
Marks(Out of 25)	**25**	**20**	**5**
Remember	2.5		1.5
Understand	2.5		1.5
Apply	10	10	2
Analyze	10	10	
Evaluate			
Create			

SEE- Semester End Examination (50Marks)

Bloom'sCategory	**SEE (50 Marks)**
Remember	5
Understand	5
Apply	20
Analyze	20
Evaluate	-
Create	-

COMMUNICATIVE ENGLISH

(Common to Physics and Chemistry cycles in the First semester)

Course Code: 21AEC11A **Credits : 01**
L: T: P: S - 1:0:0:0 **CIE Marks : 50**
Exam Hours: 2 **SEE Marks : 50**

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

CO1	Recognize the grammatical structures in English and identify errors in sentences
CO2	Demonstrate conversational skills using situational vocabulary
CO3	Examine the importance of sub skills of listening for effective communication
CO4	Analyse the importance of receptive and productive skills of communication

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	3
CO2	-	-	-	-	-	-	-	-	3	3	-	3
CO3	-	-	-	-	-	-	-	-	-	3	-	3
CO4	-	-	-	-	-	-	-	-	-	3	-	3

Module No.	Module Contents	Hours	COs
1	Self-introduction – Talking about self, ambition, hobbies, likes, dislikes, talents and achievements. Asking for and Giving Information (Pair work) **(SEE Task 1)** Asking Questions. (WH, Aux Verbs), Helping Verbs usage chart, Question Tags. Nouns, Pronouns	5	CO1
2	Talking about Routine, Repeated activities (Frequency adverbs) Verb: Main / Assistant, Forms of Verbs, Use of Do, Does in negative and question forms **Verbal Ability** Error Detection: Subject Verb Agreement	5	CO1 CO2
3	Describing people, things, actions, process **(SEE Task 2)** Describing ongoing actions Situational conversations, Role Plays Adjectives, Adverbs **Verbal Ability:** Sentence Correction, Sentence Completion.	5	CO1 CO2 CO4

4	**Listening Skills:** Importance of listening for effective communication Traits of a good listener Listening sub skills Listening to audio files of short stories, news, TV clips, Documentaries Gap filling exercise and Paraphrasing **Verbal Ability:** Common Errors in English 1 (Articles, Prepositions) Cloze Exercises	4	CO2 CO3 CO4
5	**Presentation Skills:** **Nonverbal Communication (Body Language):** Kinesics, Oculesics, Paralanguage. Overcoming stage fear, Organising a speech - Preparation, Practise, Delivery **Articulation of Ideas:** How to generate ideas and express them? Fluency development activities like comparing, expressing opinions, agreeing & disagreeing **(SEE Task 3)** Group Discussion	5	CO1

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

Reference Books:

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

Assessment Matrix:
Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 Marks)	Student Presentation (25 Marks)
Remember	5	-
Understand	5	-
Apply	10	15
Analyse	5	10
Evaluate	-	-
Create	-	-

SEE – Semester End Examination (50 Marks)

Bloom's Category	50 Marks
Remember	10
Understand	10
Apply	20
Analyze	10
Evaluate	
Create	

POLITICAL SCIENCE

Course Code: 21AEC13A/23A **Credits : 01**
L: P: T: S - 1:0:0:0 **CIE Marks: 50**
Exam Hours: 2 Hrs **SEE Marks: 50**

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

CO1	Explain the fundamentals of Political Science and other social sciences.
CO2	Describe the concept of state and basic principles of International Law.
CO3	Apply gender centric concept in various spheres of human endeavour.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	1	-	3	2	-	-	1
CO2	-	-	-	-	-	1	-	3	2	-	-	1
CO3	-	-	-	-	-	1	-	3	2	-	-	1

SYLLABUS			
Module No.	**CONTENTS OF THE MODULE**	**Hours**	**COs**
1	**Political Science:** a. Meaning, Nature, scope & Importance of political science. Utility and Relevance of Political Science. b. Relation with other Social Science. i. Political Science and Economics. ii. Political Science and Ethics. iii. Political Science and Law. iv. Political Science and public Administration. v. Political Science and History c. Study of Politics	**3**	**CO1, CO2 & CO3**
2	**State:** a. Nature and Elements of state. b. State and Civil Society. c. Theories of State d. State and Individual Liberty, Equality e. State and Nation	**3**	**CO1, CO2 & CO3**
3	**Law** **Justice** **Government** **Elements of Indian Democracy:** Understanding Democracy. Procedural Democracy **International Law**	**3**	**CO1, CO2 & CO3**

4	**Gender and Politics:** a. Understanding Gender b. Gender Rights, Gender and Social and Equal wages. c. Gender difference in political leadership.	**3**	**CO1, CO2 & CO3**
5	**Public Opinion, Political Parties and Pressure group** a. Meaning and Importance of Political Parties. b. Origin of Political Parties c. Essential Conditions for the Formation of Political Parties d. Kinds of Political Parties e. Function of Political Parties f. Pressure-Group and Lobbies **Federalism and Decentralization** Federalism: Division of Power Decentralization: Panchayat Raj and Municipalities	**3**	**CO1, CO2 & CO3**

Assessment Matrix:
Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 Marks)	Assignment (25 Marks)
Remember	5	-
Understand	10	-
Apply	10	15
Analyse	-	10
evaluate	-	-
create	-	-

SEE – Semester End Examination (50 Marks)

Bloom's Category	50 Marks
Remember	10
Understand	20
Apply	20
Analyze	
Evaluate	
Create	

Text Books:

1. A. C. Kapur-Principles of Political Science.
2. V. R. Mehta, Indian Political Thought, Manohar, New Delhi,1996.
3. John Hoffman and Paul Graham (2007) Introduction to political Theory (New Delhi: Pearson Education)
4. Agarwal, Bhushan and Bhagwan, Principles of Political Science,1971, Ramchand & Co., Delhi.
5.B. K. Gokhale: Political Science, Himalaya Publication House, New Delhi, Bangalore 2001.

Reference Books:

1.Misra Krishnakanth, Contemporary Political Theory, Pragati Publication, New Delhi,1983
2.B. K. Gokhale: Political Science, Himalaya Publication House, New Delhi, Bangalore 2001.
3.Srinivasan.J.(2008). Democracy. In Bhargava, R., & Archarya A.(Eds.) Political Theory: An Introduction. New Delhi: Pearson Longman, pp.106-128.
4.M. J. Vinod and Meena Deshpande (2013) Contemporary Political Theory (PHI Learning: New Delhi

I YEAR BE SYLLABUS- PHYSICS CYCLE

APPLIED MATHEMATICS–II

(Common to Physics and Chemistry cycles in the second semester)

Course Code	**: 21MAT21A**	**Credits**	**: 04**
L: T: P: S	**: 3:1:0:0**	**CIE Marks**	**: 50**
Exam Hours	**:3**	**SEE Marks**	**: 50**

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

CO1	Interpret the linear differential equations and their applications.
CO2	Solve initial and boundary value problems by using Laplace transform and also find the response of the system.
CO3	Analyze the convergence and divergence of an infinite series.
CO4	Justify the concept of vectors as a tool for solving engineering problems.
CO5	Formulate real world problems using partial differential equations.

Mapping of Course Outcomes to Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	3	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	1	-	-	3
CO3	3	3	3	3	3	-	-	-	-	3	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	3
CO5	3	3	3	3	3	-	-	-	-	3	-	3

Course Syllabus			
Module No.	**Contents of the Module**	**Hours**	**COS**
1.	**Linear differential equations of second and higher order:** Solution of initial and boundary value problems, Inverse differential operator techniques for the functions-e^{ax}, e^{ax} f(x), x f(x), Sin (ax + b), Cos (ax + b) and a x^n. Solution of Cauchy's and Legendre's homogeneous linear equations and variation of parameters method. **Applications**: Electrical Circuits-Simple problems.	**10**	**CO1**
2.	**Partial Differential equations:** Formation of partial differential equation by eliminating arbitrary constants and functions**.** Solution of Lagrange's partial differential equation, Solution by separation of variables method. **Applications:** Solutions of one-dimensional heat, wave and two-dimensional Laplace equation by separation of variables method.	**10**	**CO5**
3.	**Vector Calculus:** Gradient, Divergence, Curl-physical significance and problems. Solenoidal and Irrotational vector fields. Vector identities: div(grad ∅), div(Curl A), Curl(grad ∅), div(ϕA) and curl (ϕA). **Applications:** Potential functions, line integral, Problems on Gauss and Greens theorems (without proof and verification) and work done-Problems.	**10**	**CO4**

4.	**Infinite Series:** 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.	**10**	**CO3**
5.	**Laplace Transform and Inverse Laplace Transforms:** Definition and Laplace transforms of standard functions. Properties of Laplace transforms: Shifting properties, $t^n f(t)$, $\frac{f(t)}{t}$ forms. Periodic functions (without proof), unit-step function-Problems. Inverse Laplace Transform by partial fractions, completing the square method, Problems on Convolution theorem (without proof and verification). **Applications of Laplace Transform:** Solution of linear differential equations.	**10**	**CO2**

Text Books:

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

Reference Books:

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

Assessment Matrix:

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests (25 Marks)	Assignment-1 (7.5 Marks)	Assignment-2 (7.5 Marks)	Quiz-1 (05 Marks)	Quiz-2 (05 Marks)
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	-	-	-	-	-

SEE- Semester End Examination (50Marks)

Bloom's Category	50 Marks
Remember	10
Understand	10
Apply	20
Analyze	05
Evaluate	05
Create	-

ENGINEERING PHYSICS

Course Code	**: 21PHY12A/22A**	**Credits**	**: 03**
L:T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

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

CO1	Define and explain various scientific phenomena related to physics
CO2	Illustrate the physics behind the materials for diverse Engineering applications.
CO3	Apply the concepts of physics to explore solutions in Engineering and technology
CO4	Analyze and solve problems related to Engineering Physics

Mapping of Course Outcomes to Program Outcomes:

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

COURSE SYLLABUS			
Module No.	**CONTENTS OF THE MODULE**	**Hours**	**Cos**
1	**Quantum Mechanics**: Heisenberg's uncertainty principle - statement, significance, application (nonexistence 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), Basics of Quantum Computing: Bits-Qubits – superposition and Quantum entanglement- Problems.	**8**	**CO1, CO2, CO3, CO4**
2	**Dielectric & Magnetic Properties** Dielectrics, types, polarization, types and temperature dependence of polarization, Polarizability, Internal field (Expression for One dimensional solid), Clausius-Mossotti equation (Derivation), Dielectric loss, Dielectric relaxation, frequency dependence of ε_r, Ferroelectrics – properties & applications - ferroelectric RAM. Ferromagnetic Domain theory, B-H curve, Soft and hard magnetic materials, Problems on dielectrics	**8**	**CO1, CO2, CO3, CO4**
3	**Lasers& Fiber Optics** Introduction, Interaction of radiation with matter, Einstein's A and B coefficients, expression for energy density at thermal equilibrium, conditions and requisites of Laser, characteristics of laser, Types – Quantum Dot Laser and their applications Application of Laser in synthesis of materials – Laser Ablation Technique, Problems. 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), Problems.	**8**	**CO1, CO2, CO3, CO4**

4	**Conductors & Semiconductors** Quantum free electron theory, Fermi factor, variation of Fermi factor with Energy at T = 0K, T> 0K, Density of states (qualitative), Problems based on Fermi factor. Introduction to semiconductor physics, conductivity in an intrinsic semiconductor , derivation for electron concentration in intrinsic semiconductor(N_e) and mention of N_h , expression for intrinsic carrier concentration n_i from Law of mass action, expression for position of Fermi level in Intrinsic semiconductors, Hall Effect and expression for Hall coefficient in n and p type semiconductors(derivation) - applications of Hall effect, Problems	**8**	**CO1, CO2, CO3, CO4**
5	**Instrumentation Physics** Introduction to materials – Nanomaterials and composites. Introduction to characterization techniques, XRD- Bragg's Law, X-ray Diffractometer, Particle size determination. AFM – Principle, instrumentation and application, XPS – Principle, instrumentation and application, SEM – Principle, instrumentation, Application and advantages. Problems on XRD	**8**	**CO1, CO2, CO3, CO4**

Text Books

1. Modern Physics by R Murugeshan, Kiruthiga Sivaprasath, S Chand Publishing, 18th ed. 2016
2. Concepts of Modern Physics, Arthur Beiser, 7th Edition, 2017, Tata McGrawHill
3. Fundamentals of Quantum Computing by Venkateswaran Kasirajan, Springer, 2021, ISBN 978-3-030-63688-3 ISBN 978-3-030-63689-0 (eBook) https://doi.org/10.1007/978-3-030-63689-0
4. Materials Characterization Introduction to Microscopic and Spectroscopic Methods, Prof. Yang Leng, 2nd edition, 2013, Wiley-VCH Verlag GmbH & Co. KGaA, Boschstr. 12,

Reference Books

1. A Textbook of Solid State Physics, S.O. Pillai, 6th Edition, 2010,New Age International
2. Engineering Physics, D K Bhattacharya, poonam Tandon, Oxford university Press, 2015
3. Solid State Physics, C Kittel, 8th Edition, 2019, WileyIndian Edition
4. Engineering Physics, B. K. Pandey and S. Chaturvedi,1st edition, 2012, CengagePublication
5. Handbook of Materials Characterization, Surender Kumar Sharma, ISBN 978-3-319- 92954-5 ISBN 978-3-319-92955-2 (eBook), 2019, Springer

Assessment Matrix

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Tests**	**Assignment**	**Alternative Assessment***	**Quiz**
Marks (out of 50)	**25**	**5**	**10**	**10**
Remember				
Understand	10		03	
Apply	15	5	03	10
Analyze			04	

*** Paper presentation/ Group project /Seminars/ Review papers**

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (50)
Remember	04
Understand	26
Apply	20

ELEMENTS OF MECHANICAL ENGINEERING

Course Code	**: 21MEE13A/23A**	**Credits**	**: 03**
L:T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

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

CO1	Apply the concepts of conventional and non-conventional energy systems to design and develop alternate source of energy production.
CO2	Analyze the different types of IC engines and refrigeration systems and solve problems related to them.
CO3	Apply appropriate manufacturing techniques for product development in consequent to the professional Engineering practice in Mechanical Engineering.
CO4	Apply the concepts of advanced technology and visualize various ways to create the development of products with the aid of modern tools.
CO5	Understand the impact of various systems, processes and solutions of mechanical engineering in societal and Environmental context.
CO6	Analyze the different Engineering materials for their respective application in various engineering fields and study about their manufacturing processes.

Mapping of Course outcomes to Program outcomes:

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

Syllabus

Module No	MODULE CONTENTS	Hrs	COs
1	Introduction- Various Energy demands in India. **Solar Energy-** Types of Solar Energy Utilization, Solar Energy application- Solar Water heater, Space heating of buildings, Solar cooking, Solar in Agriculture. **Wind Power:** Utilization of Wind power and hydel power for electric power generation, Installed capacity of hydel and Wind power in India. **Bio-diesel a future Technology-** Growth in Global Market, advantages, disadvantages, Jatropha biodiesel in India, Process involved in Modern Biodiesel production, Electrical Power generation from Bio-fuels. **Steam Formation and Application:** Formation of steam and thermodynamic properties of steam. Simple problems using steam tables. Application of steam in power generation industry, processing industries. **Practical session/Practical Case study:** • Solar Cooking system in ShirdiSai temple • Solar deployment by MNRE • Visit to Roto-Dynamics Lab and understanding working of water turbines **Self - assessment:** • Survey on Globally implemented waste-to-energy plant and possibilities in India • Survey on Energy production from Gravity	08	**CO1**

2	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. **Practical Case study/Practical Session:** • Assembly and disassembly of Engine components • Case study GM, Nissan, Ford, Nelco vehicles **Self- assessment:** • Mechatronics and its future • Mechatronics in Automotive application	08	**CO2**
3	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 **HVAC & R-** 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. **Practical Session:** • Visit to Energy Conversion Lab- Understanding cut section of Engines, Explaining Calculating various engine parameters (demo) • Visit to Heat transfer Lab- Understanding VCR & AC cycle (demo) and Showing sample calculation for Room heating and cooling load calculation (demo). **Self- assessment:** Understand HVAC in Car	10	**CO2, CO5**
4	**Conventional Machining-** Lathe, Drilling and Milling operations- Working Principles **CNC-** Definition, Components of CNC Turning centers and Machining centers, Steps involved in CNC programming, Advantages and disadvantages. **Robotics-** 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. **NTM-** Comparison between conventional and non-conventional machining, Classification, LBM- Sketch, working, advantage, disadvantage and application, WJM- Sketch, working, advantage, disadvantage and application. **Practical Session:** • Visiting Advanced Manufacturing Lab and understanding the CNC Turning and Machining process • Visiting Machine shop Lab- understanding tradition machining **Self- assessment:** Identify the benefits of digital manufacturing	9	**CO3, CO4**
5	**Engineering Materials-** Introduction, classification, Stress, Strain and Hooke's Law **Composites-** Introduction, Classification, Metal Matrix composites (MMC) - MMC preparation by Casting process and Powder Metallurgy. Advantages, Disadvantages and Applications of MMC, **Nano composites-** Introduction, Synthesis by Top and Bottom down approach, Advantages, Disadvantages and Applications. **Rapid Prototyping-** Definition, Various RP Techniques, Methodology in RP, Application in various Engineering fields- Medical, Automobile. **Practical Session:**	9	**CO4, CO6**

	• Preparation of Composite laminates for Automotive and Aerospace application using different Reinforcement • Testing of Composite materials in Material Testing lab (demo) **Self- assessment:** Study based on Current and future trends of using composites		

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, 3rd 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, 4th edition, ISBN 0-13-092872-0

Module-4

1. M. P. Groover , Automation, Production System & Computer Integrated Manufacturing, Person India, 4th edition, 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, 2nd 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 Matrix

CIE- Continuous Internal Evaluation for theory (50 Marks)

Bloom's Category	Tests(25)	Assignment(10)	Quiz(5)	Alternative Assessment(10)
Remember	10			
Understand	10	3		
Apply	05	4	5	10
Analyze		3		
Evaluate				
Create				

* Alternative Assessment: Lab report writing, Paper writing etc.

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	**: 21CIV14A/21CIV24A**	**Credits**	**: 03**
L:T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Summarize the scope of Civil Engineering and apply the laws of mechanics.
CO2	Apply the concept of moment and couple.
CO3	Determine the equilibrium of concurrent and non - concurrent force system
CO4	Analyze the behavior of ladder, wedge and stationary block under the action of frictional force
CO5	Identify the position of centroid and compute the moment of inertia of regular cross sections.
CO6	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**	**PSO1**	**PSO2**
CO1	3	2	1	1	-	-	-	-	-	-	-	1	3	-
CO2	3	2	1	1	-	-	-	-	-	-	-	1	3	-
CO3	3	2	1	1	-	-	-	-	-	-	-	1	3	-
CO4	3	2	1	1	-	-	-	-	-	-	-	1	3	-
CO5	3	2	1	1	-	-	-	-	-	-	-	1	3	-
CO6	3	2	1	1	-	-	-	-	-	-	-	1	3	-

Module No	**Contents of Module**	**Hrs**	**Cos**
1	**SCOPE OF CIVIL ENGINEERING** 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. **INTRODUCTION TO ENGINEERING MECHANICS** 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.	**10**	**CO1**
2	**MOMENT OF A FORCE** 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. **EQUILIBRIUM OF CONCURRENT FORCE SYSTEM** 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.	**8**	**CO2, CO3**

3	**EQUILIBRIUM OF NON- CONCURRENT FORCE SYSTEM** 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. **FRICTION** 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.	**8**	**CO3, CO4**
4	**CENTROID** 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. **KINETICS** Newton's second law of motion and D'Alemberts principle for rectilinear motion of a particle, Numerical problems.	**9**	**CO5, CO6**
5	**MOMENT OF INERTIA** 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. **KINEMATICS** Definitions, Displacement, average velocity Instantaneous velocity Speed– Acceleration - Average acceleration – Variable acceleration, Acceleration due to gravity – Newton's Laws of Motion.	**9**	**CO5, 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.

Assessment Matrix

CIE Continuous Internal Evaluation (50 Marks)

Blooms Category	Tests	Assignment 1	Assignment 2	Quiz 1	Quiz 2
Marks out of 50	25	7.5	7.5	5	5
Remember	-	-	-	3	2
Understand	05	-	-	2	3
Apply	10	3	2	-	-
Analyze	10	4.5	5.5	-	-
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

SEE-Semester End Examinations (50 Marks)

Blooms Category	SEE Marks
Remember	-
Understand	10
Apply	20
Analyze	20

Percentage Evaluation of Various Blooms' levels (50 Marks)

Bloom's Category	CIE	SEE	Total	%
Remember	5		05	**5%**
Understand	10	10	20	**20%**
Apply	15	20	35	**35%**
Analyze	20	20	40	**40%**
Evaluate	-	-	-	-
Create	-	-	-	-
Total	**50**	**50**	**100**	**100%**

BASIC ELECTRICAL ENGINEERING

Course Code	**: 21EEE15A/ 21EEE25A**	**Credits**	**: 03**
L:T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

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

CO1	Solve DC and AC circuits by using the basic knowledge of mathematics, science and electrical engineering.
CO2	Examine the single phase and three phase systems and compute various parameters.
CO3	Investigate the basic construction, principle and applications of energy conversion devices namely DC & AC machines and transformers
CO4	Illustrate power generation systems in India, economic survey report, design wiring as per specifications, earthling systems, and safety principles and familiarize with the different tariff systems for energy conservation
CO5	Formulate the characterization methods of batteries and interpret concepts of battery performance
CO6	Analyze the impact of electrical vehicles in societal and environmental contexts for sustainable development

Mapping of Course Outcomes to Program Outcomes:

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

SYLLABUS			
Module No.	**Module Content**	**Hours**	**Cos**
1	**DC Circuits** **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	**AC Circuits** **Concepts of AC circuits**– rms value, average value, form factor and peak factor–single phase circuits (R,L,C,RL,RC,RLC)–power triangle –power factor **Concepts of Three phase circuits** –Relation between line and phase quantities in star and delta connected balanced systems–measurement of power and power factor by two wattmeter method	9	CO1, CO2
3	**Electromagnetic Induction and Energy Conversion** Faraday's law of electromagnetic induction–self and mutually induced emfs– statically induced and dynamically induced emfs Construction and working principle–DC machines –single phase transformer–synchronous generator–three phase induction motor	9	CO1, CO2, CO3
4	**Electric Utilities and Protection** Different sources of electrical energy through economic survey report–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 and two way wiring)– protection (Fuse & MCB)– electric shock and prevention– earthing	9	CO2, CO3, CO4
5	**Measurement and Electrochemical Power Sources** **Single phase energy meter** Faradays's laws of electrolysis, primary and secondary batteries, classification of secondary batteries based on their use, internal resistance and capacity of a cell, efficiencies of the cell, Battery ratings, voltage regulators, changing systems, main operated battery changers and application, uninterruptable power systems (UPS)- simple problems Discussion on Electric Vehicle Charging Infrastructure Implementation in India.	9	CO1, CO5, CO6

Text Books:

1. DC Kulshreshtha, "Basic Electrical Engineering", TMH, Revised second edition, 2019.
2. Metha.V.K, Rohit Metha, "Basic Electrical Engineering", Fourteenth edition, S.Chand Publishing, Revised edition 2012.
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.
5. Handbook for EV Charging Infrastructure Implementation by GOI Ministry of Power, Version-1, 2021.

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. BL-Theraja, "A TextBook of Electrical Technology: Basic Electrical Engineering", volume 1, reprint 2013.
4. J.B.Gupta, "Explanations/Solutions to an Integrated Course in Electrical Engineering", S. K. Kataria & Sons, 2018.

Assessment Matrix

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Test	Assignment	Quiz-1	Quiz-2	Alternate Assignment*
Marks(50)	**25**	**5**	**5**	**5**	**10**
Remember	2	-	-	-	-
Understand	3	-	1	1	-
Apply	15	3	2	2	6
Analyze	5	2	2	2	4
Evaluate	-	-	-	-	-
Create	-	-	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	**4**
Understand	**6**
Apply	**30**
Analyze	**10**
Evaluate	**-**
Create	**-**

***Seminars / workshops / presentations / online courses / webinars/ case studies etc.,**

ENGINEERING PHYSICS LAB

Course Code	**: 21PHL16A/26A**	**Credits**	**: 01**
L:T:P:S	**: 0:0:1:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

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

CO1	Demonstrate the usage of measuring instruments and techniques related to lab work.
CO2	Apply the practical knowledge using the experimental methods to correlate with the theoretical concepts.
CO3	Examine and interpret the experimental data using graphical techniques.
CO4	Acquire skills required for team work, technical communication and discussions

Mapping of Course Outcomes to Program Outcomes:

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

Exp. No	Experiments	Cos
1	Determination of Planck ‘s constant using LED	CO1, CO2, CO3, CO4
2	Stefan’s Law: To verify Stefan’s Law	
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	Energy Gap: To find the energy gap of a given semiconductor.	
11	Hall Effect: To measure Hall Coefficient of materials.	
12	Resistivity : Four Probe method	
13	Particle Size Determination – Using LASER	

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

Assessment Matrix

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Performance(day to day)**	**Internal test**
Marks (out of 50)	**20**	**30**
Understand	05	06
Apply	08	10
Analyze	04	10
Evaluate	03	04

SEE- Semester End Examination (50 Marks)

Bloom's Category	**SEE Marks**
Understand	15
Apply	20
Analyze	10
Evaluate	05

BASIC ELECTRICAL ENGINEERING LAB

Course Code	**: 21EEL17A/27A**	**Credits**	**: 01**
L:T:P:S	**:0:0:1:0**	**CIE Marks**	**: 50**
Exam Hours	**: 03**	**SEE Marks**	**: 50**

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

CO1	Apply the basic knowledge of mathematics, science and electrical engineering to solve for equivalent resistance by network reduction techniques and basic laws.
CO2	Analyse the behavior of DC machine, single phase transformer and 3 phase induction motor.
CO3	Apply the contextual knowledge to assess balanced three phase load and energy consumption for single phase load.
CO4	Investigate on safety aspects, wiring and consumption of electrical power in domestic installations.

Mapping of Course Outcomes to Program Outcomes:

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

Exp. No.	Experiments	COs
1	Verification of ohm's law	**CO1**
2	Verification of Kirchhoff's laws	
3	Determination of equivalent resistance using series-parallel combination	
4	Determination of equivalent resistance using star-delta transformation	
5	Speed control of DC shunt motor	**CO2**
6	Load test on DC shunt motor	
7	Speed control of 3 ϕ induction motor using vfd and measurement of f, V & I	
8	Load test on single phase transformer	
9	Measurements of electrical quantities- voltage, current, power and power factor in RLC circuit	**CO3**
10	Measurement of 3ϕ power using two wattmeter method	
11	Residential house wiring using switches, fuse, indicator and lamp	**CO4**
12	Staircase wiring	
13	Study of circuit protective devices (MCB and Fuse)	
14	Study and troubleshooting of electrical equipment (fan, iron box and mixer)	

Assessment Matrix

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Performance(day to day)**	**Internal Test**
Marks (Out of 50)	**20**	**30**
Remember	04	04
Understand	06	06
Apply	06	10
Analyze	04	10
Evaluate	-	-
Create	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Category	**SEE Marks**
Remember	6
Understand	10
Apply	18
Analyze	16
Evaluate	-
Create	-

PROFESSIONAL WRITING SKILLS IN ENGLISH

(Common to Physics and Chemistry cycles in the second semester)

Course Code: 21AEC21A **Credits: 01**
L: T: P: S - 1:0:0:0 **CIE Marks: 50**
Exam Hours: 2 **SEE Marks: 50**

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

CO1	Recall strategies to improve vocabulary
CO2	Outline the different purposes and various styles of writing
CO3	Apply the principles of 7Cs of Communication to workplace correspondence
CO4	Analyse text and infer information using the sub skills of reading.

Mapping of Course Outcomes to Program Outcomes:

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

Module No.	Module Contents	Hours	COs
1	**Writing Skills:** Types of Writing 7Cs of Communication **Language & Vocabulary:** Vocabulary in context Ways to enhance vocabulary **Verbal Ability:** One word substitution, Synonyms exercises	4	CO1 CO3 CO4
2	**Descriptive writing:** Paragraph writing Expansion of ideas Use of Discourse markers, Cohesive devices. Transition words. **Narrative writing:** Writing about past events, story writing **Verbal Ability:** Jumbled Paragraph, Precis Writing	6	CO3 CO4

3	**Analytical Writing:** Analysing charts, tables, trends, current events, Movie review **Verbal Ability:** Reading Comprehension exercises. Sub skills of Reading	4	CO2 CO3 CO4
4	**Business Writing:** General writing vs Business writing. Types of Business writing. Email etiquette Emails of complaint, apology, request, appreciation, fixing/cancellation of business appointments Designing Product Brochure **Verbal Ability:** Exercises on identifying facts, inferences and judgements	4	CO2 CO3 CO4
5	**Business Writing:** Report writing Resume building **Verbal Ability:** Verbal Analogy	4	CO3 CO4

REFERENCE BOOKS:

1. Basic Business Communication, Flately & Lesikar , Tata Mc Graw Hill , 10th Edition.
2. Business Communication, P.D Chaturvedi & Mukesh Chaturvedi , Pearson Education.
3. The Skill of Communicating, Bill Scott & Helen Wilkie , Jacob Books.
4. Communication Skills: A Workbook. – Sanjay Kumar, Pushp Lata

Assessment Matrix

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Tests	Movie Review Assignment	Brochure Designing
Marks (out of 50)	**20**	**15**	**15**
Remember		-	-
Understand	5	-	-
Apply	10	10	5
Analyze	5	5	-
Evaluate	-	-	-
Create	-	-	10

SEE- Semester End Examination (50 Marks)

Bloom's Category	Test
Remember	**10**
Understand	**10**
Apply	**20**
Analyse	**10**
Evaluate	**-**
Create	**-**

ENTREPRENEURSHIP DEVELOPMENT- 1

Course Code	**: 21AEC12A/22A**	**Credits**	**: 01**
L: T: P:S	**: 1:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**:-2**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to:

CO1	Identify passion and entrepreneurial style
CO2	Gain an understanding about identifying problems worth solving through venture
CO3	Analyze customer segment, Niche, and early adopters
CO4	Understanding and creating value proposition
CO5	Creating business model
CO6	Develop entrepreneurship among the students through sequential process of identifying problem , design thinking , identifying target customer and create business model .

Mapping of Course Outcomes to Program Outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	-	3	-	-	-	3	1	2	-	-	-	1
CO2	-	3	-	-	-	3	1	2	-	-	-	0
CO3	-	3	-	-	-	3	1	2	-	-	-	0
CO4	-	3	-	3	-	3	1	2	-	-	-	3
CO5	-	3	-	3	-	3	1	2	-	-	-	3
CO6	-	3	-	3	-	3	1	2	-	-	-	3

Module No.	**Contents of Module**	**Hrs**	**Cos**
1	**Introduction:** Finding Your Flow , Effectuation, Principal ‘s of Effectuation , Identify Your Entrepreneurial Style	**3**	**CO1**
2	Identify Problems Worth Solving, Design Thinking, Look for Solution, Present the Problem You Love.	**3**	**CO2**
3	Customers and Markets, Identify Your Customer Segments and Niche, Identify Jobs, Pains, and Gains and Early Adopters,	**3**	**CO3**
4	Craft Your Value Proposition, Outcome-Driven Innovation (ODI), Present Your Value Proposition Canvas	**3**	**CO4**
5	Basics of Business Model and Lean Approach, Sketch the Lean Canvas, Risks and Assumptions, Present Your Lean Canvas	**3**	**CO5 CO6**

Suggested Case Studies:

1. Niranjan Karagi, Nir Nal , Karnataka Boy Niranjan Karagi Develops World’s Cheapest Water Purifier (kalingatv.com)

2. From Multi-Purpose Crutches to Bullet Tractors: 8 Brilliant Innovations by Indians You Must Know From Multi-Purpose Crutches to Bullet Tractors: 8 Brilliant Innovations by Indians You Must Know - The Better India

Books for reference

1. Effectual entrepreneurship , by Stuart Read (Author), Saras Sarasvathy (Author), Nick Dew (Author), Robert Wiltbank (Author) , September 2016
2. Running Lean 2e: Iterate from Plan A to a Plan That Works (Lean Series), by Ash Maurya
3. Value Proposition Design: How to Create Products and Services Customers Want (The Strategyzer Series) – 30 October 2014 by Alexander Osterwalder (Author), Yves Pigneur (Author), Gregory Bernarda

Assessment Matrix

CIE –Continuous Internal Evaluation – 50 Marks

Assessment format	Weightage to be awarded	Comments
Quiz	20 Marks	To be administered as a part of CIE
Venture Milestone	30 Marks	Student should create VM 1, VM2, VM3 (Assignment 1,2,3)

- VM1- Presentation- Forming team, identifying problem, identifying solution (Module 1& 2)
- VM2- Presentation- Validate Solution Identify customer segment, and early adopter, Create value proposition canvas (Module-3 & 4)
- VM3- Presentation -Create business plan using lean canvas (Module-5)

SEE- Semester End Examination (50 Marks) – Practical

Bloom's Category	Tests
Remember	10
Understand	10
Apply	10
Analyze	5
Evaluate	5
Create	10

NEW HORIZON
EDUCATIONAL INSTITUTION

NEW HORIZON PUBLIC SCHOOL

Email: principalnhps@newhorizonindia.edu
Tel: +91-80-2526 1735

NEW HORIZON PRE UNIVERSITY COLLEGE

Email: principalnhpuc@newhorizonindia.edu
Tel: +91-80-2542 9361

NEW HORIZON COLLEGE

KASTURINAGAR

Email: principalnhck@newhorizonindia.edu
Tel: +91-80-2542 9361

NEW HORIZON COLLEGE

MARATHALLI

Email: principalnhcm@newhorizonindia.edu
Tel: +91-80-6629 7777

NEW HORIZON COLLEGE OF ENGINEERING

Email: principal@newhorizonindia.edu
Tel: +91-80-6629 7777

www.newhorizonindia.edu