FY Semester –II

Course Code:APS21BSL103 **Course Name:** Linear Algebra and Differential Equations **Course Category: BSC**

Credits: 4 **Teaching scheme:** L-4 **Evaluation scheme:** CA–60, ESE–40

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. This course aims to make the students become familiar with the basic concepts of linear algebra with a thorough understanding of vector spaces, linear transformations and matrix operations enhancing the students' ability to reason mathematically and able to apply this knowledge to many fields in engineering, statistics and computer science.
2. Create and analyze mathematical models using differential equations.

Course Outcomes:

On completion of the course, the student should be able to:

1. Understand basic concepts such as vector spaces, linear dependence / independence of vectors, basis and linear maps.
2. Analyze and calculate Eigen values, Eigen vectors, rank nullity of a matrix / linear map.
3. Prove theorems, apply Gram-Schmidt process on inner product spaces, diagonalizable special matrices.
4. Solve ordinary differential equations of first order and apply knowledge of differential of equations to solve engineering problems.
5. Find the solution of linear differential equations having their applications in mechanical and electrical systems.

Contents:

Unit	Content	Teaching Hours
1	**Matrices and Vector Spaces:** Basic properties of matrices, row operations and Gauss elimination, Inverse of a matrix. Basic concepts in linear algebra: vector spaces, subspaces, linear independence and dependence of vectors, bases, dimensions. Row and Column spaces, rank. Applications to systems of linear equations, Inverse transformation.	10
2	**Linear mappings and Diagonalization:** Linear mappings, representation by matrices, rank-nullity theorem, Diagonalization, Eigen values, Eigen vectors and their basic properties, Cayley Hamilton Theorem.	10
3	**Inner Product Spaces and Quadratic Forms:** Inner Product Spaces , Orthogonality, Gram-Schmidt process, Geometric Applications of Linear Transformation, Quadratic Forms: Positive Definiteness and applications	10
4	**First order ordinary differential equations and Applications:** Exact , Linear ,Bernoulli and separable differential equations, Applications to Population growth/decay, Mixing problems, Draining tank/Torricelli's Law problems, Newton's Law of Cooling, Electric circuits, Falling bodies.	10
5	**Ordinary differential equations of higher orders and Applications:** Linear differential equations with constant and variable coefficients, method of variation of parameters, Applications to mass spring systems and electrical circuits and Bending of beam and columns.	10

Text Books:
1. Introduction to Linear Algebra (2nd edition) by Serge Lang, Springer
2. Elementary Linear Algebra (10th edition) by Howard Anton and Chris Rorres, John Wiley and sons.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition,Brooks/Cole,2005.
4. S. L. Ross, Differential Equations, 3rd Edition, Wiley India, 1984.
Reference Books:
1. Shanti Narayan, Differential Calculus, S. Chand & Co.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, New York.
3. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi.
4. P. N. Wartikar, J. N. Wartikar, Applied Mathematics (Vol I & II) , Pune Vidyarthi Griha Prakashan, Pune.
5. Differential Equations with Applications and Historical notes by George Simmons, Tata McGraw Hill publishing company Ltd, New Delhi
6. K.D Joshi, Calculus for Scientists and Engineers, CRC Press.
7. Prasad and Reena Garg, Advanced Engineering Mathematics, Khanna Publishing Company Private Limited, New Delhi.
8. Schaum's outlines of Linear Algebra (5th edition) by Seymour Lipschutz, Marc Lipson, McGraw-Hill Education (India) Private Limited, New Delhi

Course Code:APS21BSL104 **Course Name:** Engineering Chemistry **Course Category: BSC**

Credits:3 **Teaching scheme:** L-3 **Evaluation scheme:** CA–40, MSE-20, ESE–40

Pre-requisites: Fundamentals of basic chemistry.

Course Objectives:

1. The primary objective of an engineering chemistry course is to familiarize the students with new developments in engineering chemistry.
2. To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.
3. The objectives of the laboratory sessions are to enable the learners to get hands-on experience on the principles discussed in theory sessions and to recognize the applications of these concepts in engineering.

Course Outcomes:

At the end of the course, students will be able to,

CO1. Illustrate the water quality parameters, water softening processes and causes of hard water in industries.
CO2. Demonstrate a comprehensive understanding of advanced concepts in polymer chemistry.
CO3. Apply fundamental concepts of corrosion science to solve problems arising in engineering applications.
CO4. Interpret physical, chemical properties and applications of fuels and lubricants.
CO5. Describe the functions of batteries and applications of modern instrumental techniques like Conductometry, pH metry, TLC, gas chromatography, UV-Visible and IR spectroscopy.

Contents:

Unit	Content	Teaching Hours
1	**Water Treatment:** Natural sources of water, Impurities in water, Water quality parameters and its BIS standards, Hardness- Definition, Types, Estimation of hardness by EDTA method, Numerical based on hardness calculation, Disadvantages of hard water, Boiler troubles (causes, effect on boiler operation and methods of prevention), Internal and external treatments, Alkalinity and its determination, Water softening: Ion exchange process, Sewage water analysis- Dissolved oxygen (DO) and its determination, Biological oxygen demand (BOD), Chemical oxygen demand (COD) and their significance, Sewage water treatment.	09
2	**Polymer Chemistry:** Introduction, Classification of polymers, Use and disposal of polymers, Polymerization and its types, Plastics and its types- Thermoplastic and thermosetting plastics, Preparation, properties and engineering applications of: PVC, PMMA, Bakelite and Epoxy resin, Moulding constituents of plastics, Methods for moulding of plastics into articles,	08

	Conducting polymers and Biopolymers (Introduction, types, examples and its applications.	
3	**Corrosion and its Control:** Introduction, Types of corrosion, Mechanism of dry & wet corrosion, Factors influencing on corrosion – Nature of metal &Nature of environment. Methods of corrosion control, Cathodic and anodic protection, Use of Inhibitors, Protective Coatings: a) Metallic coatings: Types of coatings methods of applications, (hot dipping, cladding and electroplating), b) Nonmetallic coatings: Chemical conversion coatings, Powder coatings.	08
4	**Fuels and Lubricants:** **Fuels:** Introduction, Classification of fuel, Calorific value of a fuel, Characteristics of a good fuel, Solid fuel- Coal, Various types of Coal, Analysis of coal- Proximate and Ultimate analysis, Numerical based on analysis of coals, Liquid fuel- Refining of Petroleum, Gaseous fuels- LPG and CNG. **Lubricants**: Introduction, Mechanism of lubrication, Classification of lubricants, Solid, Semi-solid and Liquid Lubricants, Properties of lubricants, Physical properties – Viscosity & Viscosity index, Surface tension, Flash and Fire point, Cloud and pour point. Chemical properties – Acid value, Saponification value, Aniline point.	10
5	**Electrochemistry and Instrumental Methods of Chemical Analysis**: **Electrochemistry**: Introduction - Basic concepts: Conductance, Specific Conductance, Equivalent conductance, Molecular conductance, Effect of dilution on conductance, Cell constant. Battery: Primary & secondary batteries, Ni-Cd cell, Lithium-air battery, Fuel cell- H_2-O_2 Cell. **Instrumental Methods of Chemical Analysis**: Basic principle, instrumentation and applications of pH metry, Conductometry, Thin layer chromatography, Gas Chromatography, Ultraviolet-Visible spectroscopy and Infra-Red Spectroscopy	10

Text Books:
1. Jain P.C & Jain Monica, Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
2. O. G. Palanna , Engineering Chemistry, Tata McGraw-Hill Publication, New Delhi.
3. S. S. Dara, A textbook of Engineering Chemistry, McGraw-Hill Publication, New Delhi.
4. Shashi Chawla, Engineering Chemistry, Dhanpat Rai and Co Education and Technical Publishers.
5. Shikha Agrawal, Engineering Chemistry- Fundamentals and Applications, Cambridge Publishers
Reference Books:
1. Barrow G.M., Physical Chemistry, McGraw-Hill Publication, New Delhi.
2. Atkins, Physical Chemistry, OUP Oxford.
3. Bhal & Tuli, Text book of Physical Chemistry, S. Chand & Company, New Delhi.
4. V. R Gowarikar, Polymer Science, New Age International Ltd.
5. B. K. Sharma, Instrumental Methods of Chemical Analysis, Krishna Prakashan Medi
E-Resources:Name of the website/ E-Journals/ Online Videos
1. NPTEL Basic Courses Engineering Chemistry (https://nptel.ac.in/courses/122/101/122101001/)

2. https://www.ncertbooks.guru/engineering-chemistry/
3. Coursera Chemistry Courses (https://www.coursera.org/browse/physical-science-and-engineering/chemistry?languages=en&page=2)
4. "Introduction to Polymer Physics" NPTEL Course (https://www.youtube.com/playlist?list=PLwdnzlV3ogoXe67WsgE8f1fOIWcc5GKKS)
5. "Introduction to Corrosion" NPTEL Course (https://www.youtube.com/playlist?list=PL8lylDWRkaW8BXestE4baRnN0699S11Lq)
6. "Tribology & Lubrication" NPTEL Course (https://www.youtube.com/playlist?list=PLLwnvFq-JAltJvWAfEVU4gcUK27hEA7FD)
7. "Electrochemistry" NPTEL Course (https://www.youtube.com/playlist?list=PLVFqK_9GOGXnnriQpsn0z1Rss96Rh0vsm)
8. "Modern Instrumental Methods of Analysis" NPTEL Course (https://www.youtube.com/playlist?list=PL400CAFBA72E94CF8)

Course Code: APS21ESL103 **Course Name:** Engineering Mechanics **Course Category: ESC**
Credits: 2 **Teaching scheme:** L-2 **Evaluation scheme:** CA–60, ESE–40

Pre-requisites:

1. Coordinate Geometry, Trigonometry, Sine & Cosine Rule, Unit Conversions
2. Fundamentals of Physics

Course Objectives:

To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

Course Outcomes:

Students are able to,

CO1. Identify the force system forgiven conditions by applying the basics of mechanics.

CO2. Determine the unknown forces of different engineering systems by applying equilibrium conditions.

CO3. Apply the principles of friction and to locate Center of Gravity and find Moment of Inertia of plane lamina.

CO4. Establish the relations between kinematic parameters for different types of motion.

CO5. Formulate there levat equations for types of motion in kinetics.

Contents:

Unit	Content	Teaching Hours
1	**Force System**: Introduction to Mechanics, Laws of mechanics, Newton's Laws, Law of Parallelogram, Law of transmissibility, Characteristics of force, System of Forces, Method of resolution and composition moment of a force, Law of Moments, Varignon's Theorem, Problem son moment, Resultant, Equivalent force & couple, properties of couple	08
2	**Equilibrium:** Introduction to Equilibrium and its types, Equilibrant, Concept of FBD, Analytical conditions of equilibrium, Equilibrium of different force system, Lami's Theorem, Types of loads, beams and supports.	07
3	**Friction, Centre of Gravity and Moment of Inertia:** **Friction:** Introduction to friction, types and application, Laws of friction, Angle of friction, Angle of repose, Cone of friction, Problems on horizontal & inclined plane, block, and ladder. **CG&MI:** Centroid of regular and composite plane lamina, MI and its application, Perpendicular axis Theorem, Parallel Axis Theorem, Radius of Gyration, Problems on plane and composite lamina.	08
4	**Kinematics:** Introduction and classification of dynamics, motion and its classification, Rectilinear Motion, Equation of Motion, Motion curves, Curvilinear Motion, rectangular and tangential components of acceleration, Projectile Motion: General Equation of Projectile Motion	04
5	**Kinetics**: Basic Concepts And laws of motion, D' Alembert's Principle, Problems on rectilinear motion, Curvilinear motion, Work Energy Principle, Work Done by force, Work Done by weight force, Work Done	03

	by frictional force, Work Done by spring force, Kinetic and Potential energy of the particle, Problemsonal cases of Work Done, Principle of Impulse and Momentum, Principle of Conservation Momentum, Impact and its types, Co efficient of restitution, Problems on impact, Problems on impulse and momentum, Kinetics of rigid body problems.	

Text Books:
1. Beer,F.PandJohnstonJr.E.R.,"VectorMechanicsforEngineers(InSIUnits):StaticsandDynamics",8thEdition,TataMcGraw-HillPublishingcompany,NewDelhi(2004).
2. Vela Murali, "Engineering Mechanics", Oxford University Press(2010).
3. S.Timoshenko,D.H.Young,"EngineeringMechanics",McGrawHill,1995.
4. TayalA.K.,"EngineeringMechanics",UmeshPublications,2010.
5. SingerF.L.,"EngineeringMechanics-Statics&Dynamics",HarperandRowPub.York.
6. Khurmi R. S. ,"Engineering Mechanics", S. Chand Publications N. Delhi.
Reference Books:
1. McLean,Nelson,"EngineeringMechanics",Schaum'soutlineSeries,McGrawHillBookCompany,N.Delhi,Publication.
2. Hibbeller,R.CandAshokGupta,"EngineeringMechanics:StaticsandDynamics",11thEdition, PearsonEducation(2010).
3. Bhavikatti,S.SandRajashekarappa,K.G.,"EngineeringMechanics",NewAgeInternational(P) LimitedPublishers,(1998).
4. Irving H. Shames and Krishna MohanaRao.G.,"EngineeringMechanics– StaticsandDynamics",4thEdition,PearsonEducation(2006).
5. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Staticsand Dynamics",3rdEdition,Vikas Publishing House Pvt.Ltd., (2005).
6. MeriamJ.L.andKraigeL.G.,"EngineeringMechanics-Statics-Volume1,Dynamics-Volume2",ThirdEdition,JohnWiley& Sons,(1993).
General Instructions:
E-Resources:
1. www.nptel.ac.in(LearningplatformfromIITprofessors)
2. http://www.asnu.com.au(ForEngineeringapplications)
3. www.discoveryforengineers.com(InvestigatingDiscoveries)

Course Code:APS21ESL104 **Course Name:** Building Programming logic in C **Course Category:** ESC

Credits:1 **Teaching scheme:** L-1 **Evaluation scheme:** CA–30, ESE–20

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. The primary objective of an engineering chemistry course is to familiarize the students with new developments in engineering chemistry.
2. To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.
3. The objectives of the laboratory sessions are to enable the learners to get hands-on experience on the principles discussed in theory sessions and to recognize the applications of these concepts in engineering.

Course Outcomes:

After the completion of this course, students will be able to:

CO1: Illustrate and explain the basic computer concepts and programming principles of C language.

CO2: Develop C programs to solve simple mathematical and decision making problems.

CO3: Develop C programs to solve simple engineering problems using looping constructs.

CO4: Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions.

Contents:

Unit	Content	Teaching Hours
1	**Introduction To C Programming:** **Fundamentals of C Programming: Overview of C:** History of'C, Algorithm and Structure of C program. Keywords, Tokens, Data types, Constants, Literals and Variables. **Operators and Expressions:** Arithmetic operators, Relational operator, Logical operators, Expressions, Operator: operator precedence and associatively, Type casting, Console FO formatting, Unformatted I/O functions: getch(), getchar, getche(), getc(), putc(), putchar().	03
2	**Array and String:** **Control statements:** If-else, conditional operators, switch and break, nested conditional branching statements, loops: do while, while, for, Nested loops, break and continue, goto and label, exit function. **Array:** Array declaration, One and Two dimensional numeric and character arrays, Multidimensional arrays, operations on array. **String:** String declaration, initialization, string manipulation with/without using library function.	03
3	**Control Statements and Functions:** **Functions:** Definition, function components: Function arguments, return value, function call statement, function prototype, Types of function, Scope and lifetime of variable, Call by value,and call by reference. Function using arrays, function with command line argument. User defined function: maths	03

	and character functions, Recursive function.	
4	**Structure and Union:** **Structure:** Basics, declaring structure and structure variable, typedef statement, array of structure, array within structure, Nested structure; passing structure to function, function returning structure. **Union:** basics, declaring union and union variable, Difference between Structure and Union **Enum:** declaring enum and enum variable.	03
5	**Pointers**: **Pointer:** Definition of pointer, advantage and disadvantage using pointer, Pointer declaration, Using & and * operators. Void pointer, Pointer to pointer, Pointer in math expression, Pointer arithmetic, Pointer comparison, **Dynamic memory allocation functions**: malloc, calloc, realloc and free, Pointer vs. Array, Array of pointer, Pointer to array, Pointers to function, Function returning pointer, Passing function as Argument to function, Pointer to structure, Dynamic array of structure through pointer to structure.	03

Text Books:
1. Programming in ANSI C, E Balagurusamy, Tata McGraw-Hill, Third Edition.
2. Let Us C, Yashwant Kanetkar, Infinity Science Press, Eighth Edition.
3. Mastering C, K R Venugopa1, Tata McGraw-Hill.
Reference Books:
1. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, 2nd Edition. 5. Applications Programming in ANSI C, R. Johnson Baugh , Martin Kalin, Macmillan, 2nd Edition.
2. The Spirit of C, Mullish Cooper, Jaico publishing House.
3. How to solve it by Computer, R. G. Dromey, Pearson Education.

Course Code:APS21PCL101 **Course Name:** Basics of Electrical and Electronics Engineering **Course Category:** PCC

Credits:2 **Teaching scheme:** L-2 **Evaluation scheme:** CA–60, ESE–40

Pre-requisites: Pre-university mathematics.

Course Objectives:

1. Understand Electrical circuits and classify circuit sasper laws.
2. Understand Magnetic circuits and apply them intrans for merdevices.
3. Understand the working principle of semiconductor devices.
4. Understand the basics and applications of digital electronics.

Course Outcomes:

After completion of this course, students will be able to:

1. Solve simple D C and single-phase A C circuits using KCL, KVL and network theorems.
2. Explain fundamentals of magnetic circuit and transformers.
3. Explain the working of diodes and transistors.
4. Explain the importance of number systems and logic gates.

Contents:

Unit	Content	Teaching Hours
1	**Electrical Circuits:** Voltage and current sources: independent, dependent, ideal and practical; V-I relationships of resistor, inductor, mutual inductor and capacitor; Kirchhoff's laws, mesh and nodal analysis, superposition, The venin's, maximum power transfer theorems. Alternating voltages and currents, RMS, average, maximum values, Single Phase RL, RC, RLC series circuits, Power in AC circuits, Power Factor, Three phase balanced systems.	08
2	**Magnetic Circuits & Transformer:** Concepts of m.m.f, flux, flux density, reluctance, permeability and field strength, their units and relationship, right hand thumb rule and corkscrew rule, Faraday's law of electromagnetic induction, Fleming's right-hand rule, statically and dynamically induced EMF' ssel fandmutual inductance co efficient of coupling, energy stored in magnetic circuit, Single phase transformers: Construction, principle of working, e.m.f. equations.	08
3	**Semiconductor Devices:** Introduction to Semiconductors, P-type and N-type Semiconductors, P-N Junction Diode: Construction and working, V-I characteristics of Diode, Reverse break down mechanism. Special purpose diodes: Zener Diode, Light Emitting Diode(LED) and Photo Diode -Construction, working and applications. Bipolar Junction Transistor (BJT): types, construction and regions of operation.	07
4	**Digital Electronics:**	07

	Binary, Decimal, Octal, Hexadecimal number systems and their inter-conversion, Binary Addition, Binary Subtraction, One's complement, Two's complement, Logic Gates: Basic, Universal and Special. Boolean Laws (AND, OR, NOT) and Demorgan's theorems, Realization of basic logic gates using universal gates.	

TEXTBOOKS:
1. V.N.MittalandArvindMittal,"BasicElectricalEngineering"McGrawHill
2. Edward Hughes," Electrical Technology,", Pearson Education
3. ElectricalTechnologyVol.1& Vol.4byB.L. Theraja & A. K. Theraja, S. Chand Publications
4. "Principles of Electronics", V. K. Mehta, S. Chand Publications.
5. "Electronics Devices and Circuits", S Salivahanan, McGraw Hill Publications.
REFERENCEBOOKS:
1. VincentDelToro,"ElectricalengineeringFundamentals",PHIsecondedition2011
2. RobertBoylestad,"ElectronicsDevicesandCircuitsTheory",PearsonEducation India
3. "Electronics Devices and Circuits Theory", Robert Boylestad, Pearson Education India.
E-Resources:
1. Online course on NPTEL "Basic Electrical Engineering"
2. NPTEL Course on "Introduction to Basic Electronics", Prof. T.S. Natarajan, IIT Madras.
3. NPTEL Course on "Digital Electronic Circuits", Prof. Goutam Saha, IIT Kharagpur.

Course Code: APS21IKL101 **Course Name:** Indian Knowledge Systems **Course Category:** IKS

Credits:2 **Teaching scheme:** L-2 **Evaluation scheme:** CA–60, ESE–40

Pre-requisites: Nil

Course Objectives:

The objective of this course is

1. To make students understand foundational concepts in IKS for science, engineering and technology.
2. To explore ancient Indian pursuits and accomplishments in the various domains of engineering

Course Outcomes:

On completion of the course, the student should be able to:

CO 1: familiarize with key components of the IKS & develop appreciation for Indian philosophical systems.

CO 2: understand key features of Indian Numeral System, units of measurement and the framework for establishing the right knowledge.

CO 3: appreciate the unique & specific contributions of ancient Indian mathematicians in Arithmetic, Geometry & Trigonometry.

CO 4: develop awareness about engineering & technology heritage of India and understand ancient Indian contributions in various engineering domains.

Contents:

Unit	Content	Teaching Hours
1	**Introduction to IKS:** Importance of ancient knowledge, defining IKS, Classification framework for IKS, Historicity of IKS, Indian philosophical systems, Vedic schools of philosophy (Sankhy and yoga, Nyaya and Vaisesika, Purva- Mimamsa and Vedanta), Non- Vedic philosophical systems (Jain, Bauddha and Carvaka) , Wisdom through the ages: Issues of interest in the Puranas, Itihasa as a source of wisdom (Uniqueness of the two epics), Nitisastras.	08
2	**Foundational Concepts for Science and Technology:** Number system in India, salient features of the Indian numeral system, Measurements for Time, Distance and weight, The knowledge triangle, Prameya- a Vaisesikan approach to Physical Reality, Pramana – The means of valid knowledge, Framework for establishing valid knowledge.	07
3	**Science in IKS:** Mathematics: Great mathematicians and their contributions, Arithmetic (square of a number, square root, series and progressions), Geometry (Property of right angled triangle in Sulba- sutras, value of π), Trigonometry,	07

	Algebra, Binary Mathematics and combinatorial problems in Chandah-Sastra of Pingala	
4	**Engineering and Technology in IKS:** The Indian Science and Technology Heritage, Mining and ore extraction, Metals and metal working technology, Iron and Steel in India, Lost wax casting of idols and artifacts, apparatuses used for extraction of metallic components. Literary sources for Science and Technology, Physical Structures in India, Irrigation & Water Management, Dyes and Painting Technology, Shipbuilding.	08

Textbooks:
● Mahadevan B., Bhat Vinayak Rajat & Nagendra Pavana R.N. "Introduction to Indian Knowledge System Concepts and Applications" PHI,2023.
● Jha Amit "Traditional Knowledge System in India" Atlantic Publishers and Distributors (P) Ltd,2023
● Chauhan Bhag Chand "IKS: The Knowledge system of Bharata" Garuda Prakashan,2023
● Bag A.K., "Mathematics in Ancient and Medieval India" Chaukhambha Orientalia, 1979
● Sengupta Nirmal,"Traditional Knowledge in Modern India"Springer,2019
Reference Books:
● Bag A.K., "History of Technology in India, Vol. I" Indian National Science Academy,1997
● Kumar Alok, "Ancient Hindu Science" Jaico Publishing House,2019
● Datta B and Singh A.N."History of Hindu Mathematics:Parts I and II" Asia Publishing House,1962
● Kapoor Kapil, Singh Awdhesh Kumar "Indian Knowledge Systems Vol.-I & II" D.K. Print World Ltd,2005
E-Resources:
• https://www.youtube.com/watch?v=-cBd6JYPWtY&list=PLRfu94TCePTtWtu0x145H_63WgoeYickE
• https://www.youtube.com/watch?v=yvj5ROYbP2E&list=PLRfu94TCePTtLuEYSzmJXNYK_EnDSvY3N
• https://iksindia.org/book-list.php

Course Code:APS21VSP102 **Course Name:** Workshop Practices **Course Category:**VSEC

Credits:2 **Teaching scheme:** L-4 **Evaluation scheme:** CA–60, ESE–40

Pre-requisites: Pre-university English.

Course Objectives:

1. To know about the different carpentry tools and perform various carpentry operations to complete the job.
2. To understand different welding tools, joints, defects and perform welding operation to complete useful article/job.
3. To learn various types of pipes, plumbing tools, operations and perform thread cutting on GI pipes.
4. To know different sheet metal tools, operations, applications and perform various operations to complete job.

Course Outcomes:

On completion of the course, the student should be able to:

1. Perform basic carpentry operation on wood and prepare carpentry article.
2. Perform welding processes and prepare welding article by performing various welding operations.
3. Use plumbing tools, processes and perform threading on GI pipe.
4. Use sheet metal tools, processes and prepare sheet metal article.

Contents:

Unit	Content	Teaching Hours
1	**Carpentry Shop:** Carpentry shop: Types of woods, tools, joints, operations, applications, safety measures etc. Job: Exercises on wood involving operations marking, sawing, chiseling, planning, grooving etc to make useful wooden article/ job e.g. Wooden Trophies, Showpiece articles, Stools etc.	08
2	**Welding Shop:** Welding Shop: Types of welding, welding joints, tools, welding defects, applications, safety measures etc. Job: Exercise in Arc welding to make useful articles like Grills, Stools, Tree Guards, Flower pot stand, Shoe rack, Bag Stand, Showpiece Articles from Scrap etc.	07
3	**Plumbing Shop:**	07

	Plumbing shop: Study of types of pipe, pipe joints, operations, applications, safety measures etc. Job: Prepare threading on GI pipe to make useful items like Nipple, Pipe joints etc.	
4	**Sheet Metal Shop:** Sheet Metal Shop: Sheet metal tools, operations, applications, safety measures etc. Job: Making an utility item using G I sheet involving development, marking, cutting , bending, spot welding/riveting Parts like i) Tray, ii) Funnel etc.	08

• **Term work:** Students shall maintain workshop diary which contains Job Drawing, information of tools, operations required to complete the jobs, records of job completions etc.
• **End Semester Exam:** ESE will be viva-voce based on jobs prepared by the students during the term.
Text Books:
1. Hazra and Choudhary, Workshop Technology-I, Media promoters & Publisher private limited.
2. Hazra and Choudhary, Workshop Technology-II, Media promoters & Publisher private limited.
Reference Books:
1. K. C. John, Mechanical Workshop Practice, Prentice Hall Publication, New Delhi, 2010.

Course Code:APS21BSP102 **Course Name:** Engineering Chemistry Lab **Course Category:** BSC
Credits: 1 **Teaching scheme:** P-2 **Evaluation scheme:** CA–30, ESE–20
Pre-requisites: Nil

Course Objectives:

Course Outcomes: Upon completion of the Lab Experiments, the students should able to,

LO1 Perform the experiments as well as accurately record the readings and analyze the results of such experiments.

LO2 Estimate the impurities present in water using titri metric and instrumental methods.

LO3 Employ the basic techniques used in chemistry laboratory for analysis such as volumetric titrations, complex metric titrations, Conductometry, pH metry, viscometer, Stalagmometer and TLC

Contents:

Sr. No.	List of Practical	Lab Hours
1	Determination of hardness of water sample by EDTA method.	02
2	Determination of chloride content in water sample by precipitation titration method.	02
3	Determination of dissolved oxygen in water by Iodometric method.	02
4	Determination of percentage purity of bleaching powder.	02
5	Determination of strength of acid / base using pH metric titration.	02
6	Determination of strength of acid / base using Conductometry titration.	02
7	To determine the cell constant of the given conductivity cell.	02
8	To determine relative surface tension of unknown liquids by using Stalagmometer.	02
9	To determine the viscosity of unknown liquids by using Ostwald / Redwood viscometer.	02
10	To determine acidity of given water sample.	02
11	Determination of acid value of an oil sample.	02
12	Determination of Saponification number of an oil sample.	02
13	To determine alkalinity of given water sample.	02
14	Preparation of phenol- formaldehyde / urea-formaldehyde resin.	02
15	To find out the Rf value of given sample by thin layer chromatography.	02
16	To separate the given mixture using thin layer chromatography.	02
17	Proximate analysis of coal (moisture content, volatile matter, ash content).	02
18	To study factors influencing on rate of electrochemical corrosion.	02
19	To determine flash and fire point of given oil by Pesky-Marten flash point apparatus.	02
20	To determine cloud and pour point of lubricating oil.	02

Reference Books:

1. A Text book on Experiments and Calculations in Engineering Chemistry by Dr. S. S. Dara, S Chand Publication.
2. Laboratory manual on Engineering Chemistry by S. K. Bhasin & Sudha Rani, Dhanpat Rai Publishing Company.
3. Engineering Chemistry with Laboratory Experiments by M. S. Kaurav, Asia-Pacific the holdings Private Ltd.

Course Code:APS21ESP104 **Course Name:** Engineering Mechanics lab **Course Category:** ESC

Credits: 1 **Teaching scheme:** P-2 **Evaluation scheme:** CA–30, ESE–20

Pre-requisites: Nil

Course Objectives:

Course Outcomes:

Upon completion of the Lab Experiments, the students should able to,

1. Describe the working principle of mechanics and correlate them with day to day engineering applications.
2. Formulate and solve mechanics problems based on law of moments, conditions of equilibrium.
3. Verify theoretical concepts through analytical, experimental and graphical methods.

Contents:

Sr. No.	List of Practical	Lab Hours
1	Verification of law of Machine using Screw jack	02
2	Polygon law of coplanar forces.	02
3	Bell crank lever	02
4	Lami's Theorem	02
5	Support reactions for beam	02
6	Problems on beam reaction by graphics statics method	02
7	Inclined plane (to determine coefficient of friction).	02
8	Centroid of irregular shaped bodies	02
9	Determine center of gravity for composite sections	02
10	Determine moment of inertia for composite sections	02
11	Moment of Inertia of fly wheel	02
12	Simple / compound pendulum	02

References:

1. "College of Engineering, Pune"
2. "University of Mumbai"

Course Code: APS21ESP105 **Course Name:** Building Programming logic in C-LAB **Course Category:** ESC

Credits: 1 **Teaching scheme:** P-2 **Evaluation scheme:** CA–30, ESE–20

Pre-requisites: Nil

Course Objectives: Nil

Course Outcomes: Nil

Contents:

Sr. No.	List of Practical	Lab Hours
1	a) Write a C program to find sum and average of three numbers. b) Write a C program to find the sum of individual digits of a given positive integer.	02
2	a) Write a C program to generate the first n terms of the Fibonacci sequence b) Write a C program to generate prime numbers between 1 to n. c) Write a C program to check if the given number is Armstrong or not	02
3	a) Write a C program to check whether the given number is perfect or not b) Write a C program to check whether the given number is strong or not	02
4	a) Write a C program to find the roots of a quadratic equation. b) Write a C program perform arithmetic operations using switch statement.	02
5	a) Write a C program to find factorial of a given integer using non-recursive function b) Write a C program to find factorial of a given integer using recursive function	02
6	a) Write C program to find GCD of two integers by using recursive function. b) Write C program to find GCD of two integers by using non-recursive function.	02
7	a) Write a C program to find the largest and smallest number in a list of integers. b) Write a C program to Sort the Array in an Ascending Order. c) Write a C program to find whether the given matrix is symmetric or not.	02
8	a) Write a C program to perform addition of two matrices. b) Write a C program using function to perform multiplication of two matrices.	02
9	a) Write a c program to use function to insert a sub-string in to given main string from a given position. b) Write a c program to swap the values of two variables using (i) call by value (ii) call by reference	02
10	a) Write a C program using user-defined functions to determine whether the given string is palindrome or not. b) Write a C program that displays the position or index in the main string S where the sub string T begins, or - 1 if S doesn't contain T.	02
11	a) Write C program to count the number of lines, words and characters in a given text. b) Write a C program to find the sum of integer array elements using pointers.	02
12	a) Write a C Program to Calculate Total and Percentage marks of a student using structure.	02

Course Code:APS21PCP101 **Course Name:** Electrical and Electronics Technology Lab **Course Category:** PCC

Credits: 1 **Teaching scheme:** P-2 **Evaluation scheme:** CA–30, ESE–20

Pre-requisites: Nil

Course Objectives:

1. Understand the DC circuit as per KCL & KVL and AC circuits as per theorems.
2. Understand the working of a single-phase transformer.
3. Understand the working of electronic instruments, components and logic gates.
4. Understand the working of a PN junction diode.

Course Outcomes:

After completion of this lab, students will be able to:

1. Use of KCL&KVL to solve D C circuits as well as use of AC theorems to solve AC circuits.
2. Demonstrate a single-phase transformer & it's working.
3. Use electronic instruments, working of electronic components and logics gates.
4. Use of P N Junction Diode and its applications.

Contents:

Sr. No.	List of Practical	Lab Hours
1	Verification of Loop Analysis and Nodal Analysis for DC Circuits.	02
2	Verification of The venin's Theorem for DC Circuits.	02
3	Verification of Maximum Power Transfer Theorem for DC Circuits.	02
4	Determination of Voltage, Current and Power Flow in Single Phase AC Circuit including R, L and C with Combination.	02
5	Determination of Magnetic Material Terms and EMF Induction.	02
6	Demonstration and Determination of Single-Phase Transformer Terms like Voltage Ratio and Turns Ratio.	02
7	Study of Electronic Instruments.	02
8	Study of Electronic Components.	02
9	Study of Logic Gates.	02
10	Study of V-I characteristics of a PN Junction Diode using V-Lab.	02
11	Study of Rectifier Circuits using Every Circuits emulation application.	02
12	Study of working and troubleshooting of Smartphone, Computer & TV (Case Study Approach).	02

Course Code: MGM82CCP104 **Course Name:** National Service Scheme (NSS) **Course Category:** CCA

Credits: 2 **Teaching scheme:** P-4 **Evaluation scheme:** CA-50, ESE-0

Pre-requisites: Nil

Course Objectives: Nil

Course Outcomes: Nil

Contents:

Sr. No.	List of Practical	Lab Hours
1	**Introduction to National Service Scheme(NSS):** **Emergence of NSS in India (Historical Background) and its development.** Organizational Structure of National Service Scheme from National Level to College Level. Objectives of National Service Scheme(NSS) National Service Scheme(NSS)–Symbol and its meaning **Symbol of NSS and its meaning** Motto of National Service Scheme (NSS) Various prayers, inspirational songs to be used in NSS Programme.	08
2	**National Service Scheme (NSS) Regular Activities:** **Guidelines of Distribution of working hours or academic year.** **Classification of Regular Activities in the Society** • Rural • Urban • Campus • Need base with association **Associations in NSS Activities** • Govt. Organization • NGO Scope for Innovation (Self-Generated)	08
3	**Social Issues in India:** **Concept of Society, Community (Steps in volve dine valuation of society)** • Features of Indian Society • Communities in India **Basic Social Issues in India** Family System, Division of labour, Cast System in India, Gender Issues, Regional Imbalance	07
4	**Indian Constitution and Social Justice:** **Indian Constitution** • Preamble • Structure	07

	• Features • Fundamental Rights & Duties **Social Justice** • Social Justice – the Concept and its features Contribution for Social Justice – Mahatma Jyotiba Phule, Dr. Babasaheb Ambedkar, Shahu Maharaj.	

References:

1. National Service Scheme Manual (Revised) 2006, Government of India, Ministry of Youth Affairs and Sports, New Delhi.
2. University of Mumbai National Service Scheme Manual 2009
3. Avhan Chancellor's Brigade-NSS Wing, Training camp on Disaster Preparedness Guidelines, March 2012.
4. Rashtriya Seva Yojana Sankalpana- Prof. Dr. Sankay Chakane, Dr. Pramod Pabrekar, Diamond Publication, Pune.
5. National Service Scheme Manual for NSS District Coordinators, National Service Scheme Cell, Dept. of Higher and Technical Education, Mantralaya,
6. Annual report of National Service Scheme (NSS) published by Dept. of Higher and Technical Education, Mantralaya,
7. NSS Cell, Dept. of Higher and Technical Education, Mantralaya, UTKARSHA- Socio and cultural guidelines.

Course Code:MGM73CCP105	**Course Name:** Fine Art	**Course Category:** CCA
Credits: 2	**Teaching scheme:** P-4	**Evaluation scheme:**CA-50, ESE-0
Pre-requisites: Nil		

Course Objectives:

The objective of this course is

- Students will be able to draw clean lines.
- Students will be able to explore shading from light to dark.
- Students will be able to draw perspective drawing.
- Students will be able to sketch landscape and portrait drawing.

Course Outcomes:

On completion of the course, the student should be able to:

- Students will be able to pay attention to core details in visualization.
- Students will be able to represent on paper what they have observed in terms of 3 and 2 dimensional objects and light and dark play of perspective.
- Students will be able to draw clean lines and neat figures which will gradually help them in fashion illustrations.

Contents:

Sr. No.	List of Practical	Lab Hours
1	**Introduction to Drawing:** • Explore pencil as medium for drawing and exploration of different types of grade of pencils. • Lines – Freeing hand movement by practicing various ways to draw lines (wavy/zigzag/diagonal/vertical/horizontal)	08
2	**3D objects with Shading:** • Exploring and sketching 3D objects with Shading/Hatching – Light to Dark (HB/2B/3B/4B/5B/6B) • Space Division – Studying of proportion, Perspectives- Coin / Box / Landscape.	07
3	**Sill Drawing:** • Introduction to landscape and portrait drawing. • Still drawing (perspective drawing of man- made object)	07
4	**Exploration of colour mediums:** • Exploration of color mediums (chalk/ink/poster/pastels/water) • Landscape perspective of natural and man- made, charcoal rendering. • Still drawing of man- made and natural object by rendering and defining Perspective. Ambedkar, Shahu Maharaj.	08

Reference Books:

- Mellem, Jeff; Sketching people & Live drawing basics.
- Belleville- Van Stone, France; Sketch: the Non-Artist's guide to inspiration

Course Code: MGM73CCP106 **Course Name:** Visual Art **Course Category:** CCA

Credits: 2 **Teaching scheme:** P-4 **Evaluation scheme:**CA-50, ESE-0

Pre-requisites: Nil

Course Objectives:

The objective of this course is

- To understand the actual work process in advertising market.
- To understand the growth and necessity of advertising in market.

Course Outcomes:

On completion of the course, the student should be able to:

- Students will be able to choose a topic for campaign design.
- Students will understand that how campaign design is necessary
- Student will understand the actual work process in advertising market.
- Student will understand the process of designing.

Contents:

Sr. No.	List of Practical	Lab Hours
1	**Introduction to Campaign Design:** • Topic for campaign design • It should be either product, service or social topic. • Mind mapping	08
2	**Media:** • Different types of media • New digital medias • Use of elective subject in campaign • Software use in designing	11
3	**Sill Drawing:** • Final layout • Printing in actual size media • Presentation on ppt of the topic includes artwork with rough work.	11

Reference Books:

- Advertising Campaign Design Just the Essentials - By Robyn Blackman
- Campaign Strategies and Message Design: A Practitioner's Guide from Start to Finish - by Mary Moffitt (Author)
- Student should refer the previous knowledge about medias and refer the internet for help**.**