Semester I

Course Title: Fundamentals of Mechanical Engg. **Max. Marks: 100**
Course Code: CE-121 **University Exam: 60**
Duration of Exams: 3 hours **Sessional Assessment: 40**

Objective: The course is designed to give some basic concepts of mechanical engineering to the students. They will be introduced to thermodynamics, refrigeration, air-conditioning, turbines and mechanical power transmission.

UNIT-I

Basic Concepts of Thermodynamics: Introduction, States, Work, Heat, Temperature, Zeroth, first, second and third law of thermodynamics, Concept of internal energy, enthalpy and entropy. Numerical problems.

UNIT-II

Steam: Properties of Steam & Steam Generator, Formation of steam at constant pressure, Thermodynamic properties of Steam, Use of steam tables, Measurement of dryness fraction by throttling calorimeter.

UNIT-III

Refrigeration & Air-conditioning: Introduction to refrigeration and air-conditioning, Rating of refrigeration machines, Coefficient of performance, Simple refrigeration vapour compression cycle, Psychometric charts and its use, Human comforts.

UNIT-IV

Hydraulic Turbines & Pumps: Introduction, Classification, Construction details and working of Pelton, Francis and Kaplan turbines, Specific speed and selection of turbines, Classification of water pumps and their working. Introduction to IC Engines.

UNIT-V

Motion, Power Transmission Methods and Devices: Rotational motion, angular velocity and rotational work & power. Introduction to Power transmission, Types of gears, power in gear set, Belt, Rope, Chain and Gear drive. Types and functioning of clutches.

Course Outcomes:

After completion students will be able:

1. To acquire knowledge about the fundamentals of thermodynamic laws, concepts and principles.

2. To understand the principles of refrigeration and conditioning.
3. To acquire knowledge about the principles of Hydro turbines and pumps, their construction, way of functioning and the flow process that take place in these machines.
4. To learn about the mechanics of power transfer through belt, rope, chain, clutch end gear drive.
5. To learn how to use steam table to solve the numerical problems in a shortcut method.

Recommended Books:

1. Rajput R. K., Elements of Mechanical Engineering, Lakshmi Pub., Delhi
2. Kumar D.S., Elements of Mechanical Engineering, S.K. Kataria and Sons
3. Nag P.K. Engineering Thermodynamics, TMH, New Delhi
4. Arora & Domkundwar, Refrigeration & Air-conditioning, Dhanpat Rai & Co. Pvt Ltd
5. Ryder G.H., Strength of Materials, ELBS Publication
6. Modi and Seth, Hydraulic and Fluid Mechanics, Standard Book House, Publication, New Delhi
7. Arora C.P., Engineering Thermodynamics, TMH, New Delhi
8. Arora C.P., Refrigeration & Airconditioning, TMH, New Delhi
9. Ostwald, Munoz, Manufacturing Process and Systems, John Wiley, India

Note for paper setter: The question paper shall comprise of 10 questions. Two questions shall be set from each Unit. The students have to attempt five questions, selecting one from each Unit.

SEMESTER I

Course Title: Mathematics-I **Max Marks: 100**
Course Code: CE-122 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The course is designed to provide basic knowledge of theory of differential calculus, complex trigonometry and sequence & series to engineering students.

Unit-I

Complex Trigonometry : Review of algebra of complex numbers, De-Moiver's theorem and its applications, Exponential and Circular functions of a complex variable, Hyperbolic and Inverse hyperbolic functions, Logarithmic function of a complex variable, Summation of series-$C+iS$ method.

Unit-II

Differential Calculus: Successive differentiation and Leibnitz's theorem, Functions of more than one variable and partial differentiation, Geometrical and physical significance of partial derivatives, Homogenous functions and Euler's theorem, Taylor's and Maclaurin's series of function of one and two variables, Expansion of functions, Maxima and Minima of two variables and Lagrange's multipliers.

Unit-III

Integral Calculus: Definite Integral and their properties, Differentiation under integral sign, Gamma, Beta and Error functions. Transformation of Cartesian co-ordinates into polar, spherical and cylindrical co-ordinates, Multiple integrals, Change of order of integration and applications to simple problems.

Unit-IV

Ordinary Differential Equations: Differential equations of first order and first degree and their solution of the types: Equations where variables are separable, Homogenous equations, Linear equations, Exact equations and Equations reducible to the above forms, Higher order linear differential equation with constant co-efficient, Solutions of equations reducible to linear equations with constant co-efficient, Cauchy's homogenous linear equation and Legendre's linear equation, Applications of ODEs to simple problems of physical sciences and Engineering.

Unit-V

Sequence and Series: Convergence and Divergence of sequences and series, Comparison test, D'Alembert's ratio test and Cauchy's root test, Alternating series, Leibnitz's rule, Conditionally and absolute convergence.

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

1. Understand the basic complex trigonometry concept and apply the correct procedure to solve the problems
2. Comprehend the consequences Euler's theorem, Taylor's and Maclaurin's series of function of one and two variables. They also identify the extrema of a function on an interval and apply the maxima and minima optimization techniques to basic engineering problems
3. Apply the concept and principles of integral calculus to solve geometric and physical problems.
4. Solve the different kinds of ordinary differential equations (ODEs) and apply these ODEs to formulate basic mathematical models in engineering.
5. Comprehend some techniques for testing the convergence of sequences and series and applying them to various engineering problems.

Books Recommended:

1. **Grewal B.S** Higher Engineering Mathematics.
2. **Narayan Santi**, Differential Calculus.
3. **Narayan Santi**, Integral Calculus.
4. **Ross S.L**, Differential Equations.
5. **Piaggio H.T.H,** Differential Equations and its Applications.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions shall be set from each Unit. The students have to attempt five questions, selecting one from each Unit. Use of calculator is allowed in the examination

SEMESTER I

Course Title: Computer Fundamentals **Max Marks: 100**
Course Code: CE -123 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The objective of this course is to provide basic knowledge of computers, software, language and computer networks

Unit-I

Introduction: History of Computers, Generations of Computers, Classification of Computers, Application of Computers, Computer Hardware, Input, and Output devices. Memory Hierarchy, RAM, ROM, PROM and types, Secondary memory, working of a Hard Disk and its types.

Unit-II

Software and Languages: Computer Software, System and Application Software, BIOS, POST, Booting Process, Virus, WORM, and Trojans.
Programming Languages, Generations of Languages, Compilers, Assemblers, Machine Language, and Assembly Language. Introduction to algorithm and flow chart. Representation of an algorithm, flow chart symbols and levels of flow chart, rules, advantage and limitations of flowchart and pseudo code.

Unit-III

Data Representation and Number System: Binary, Decimal, Octal and Hexadecimal number systems, Inter conversion of number system, 1's compliment, 2's compliment, 9's compliment, n's compliment. Logic Gates, Boolean Algebra, Alphanumeric representation, Fixed point representation.

Unit-IV

Booting process details of Dos and Windows: - DOS system files, Internal and External Commands , Difference between External and Internal Commands. Internal Commands:- MD, CD, RD, COPY CON, TYPE, DATE & TIME, VOLUME VERSION, REN, PROMPT, CLS, DIR/P/W, COPY , DEL External commands:- FORMAT , DISKCOPY, DISKCOMP, XCOPY, CHKDISK, SCANDISK, HELP, DEBUG, PRINT. Creation of Batch Files.

Unit-V

Introduction to Computer networks and security: Computer networks and application, types of computer networks, Peer-to-Peer Networks, Client Server Networks, Centralized and Distributed Systems, Internet, Intranet, Extranet, email, ISPs.

Course Outcomes:
Upon completion of this course, the students will be able to:
1.Know the basic components of the computer and working of each device.
2.Understand functioning of Operating System and formulate simple algorithms for arithmetic and logical problems
3.Understand the representation of data in computer.
4.Understand the booting process and several DoS Commands.
Know the fundamentals of Computer Networking

Text Books Recommended:

1. **Peter Norton**, Introduction to Computers, TMH Publications.
2. **Sanjay Toledo Mata**, A First Course in Computers, TMH Publication.

References:

1. **Rajaraman**, Introduction to Digital Computer Design, Prentice Hall India.
2. **Bartee and Thomas**, Digital Computer Fundamentals, TMH Publication.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions shall be set from each Unit. The students have to attempt five questions, selecting one from each Unit.

SEMESTER I

Course Title: Basic Electrical Engineering **Max Marks: 100**
Course Code: CE-124 **University Examination: 60**
Duration of Exam: 3 hours **Internal Assessment: 40**

Objective: The course has been designed to provide basic knowledge to the students about the principles of electric circuit analysis, electromagnetism and transformers.

Unit-I

Review Of Electric Circuit Laws And Energy Sources: Basic Electrical circuit terminology, concept of charge and energy, circuit parameters (resistance, inductance. Capacitance), ohm's law, Kirchoff's current law (KCL), Kirchoff's voltage law (KVL), series and parallel combinations of resistance, inductance& capacitance. Ideal and practical voltage & current sources and their transformations, dependent voltage and current sources.

Unit-II

D.C Circuit Analysis: Power & energy relations, analysis of series parallel DC circuits, Star Delta transformations (ΔϒY), Loop & Nodal methods, Network Theorems: Thevenin's, Norton's, Maximum Power Transfer and Superposition Theorems (D.D Analysis only).

Unit-III

Electromagnetism: Review of Fundamentals of Electromagnetism, Ampere's Law, analogies between electric circuits and magnetic circuits, Faraday's laws of electromagnetic induction, direction of induced emf, Lenz's law, magnetic saturation and leakage fluxes.

Unit-IV

A.C. Circuit Analysis: Basic terminology and definitions, phasor and complex number representations, power energy relations in AC circuits, application of Network Theorems to AC circuits ,Resonance in series and parallel circuits, Concepts of active & reactive powers, Introduction to 3 phase circuits.

Unit-V

Transformers: Concept of Inductance, Self & Mutual Inductance, Conventions for magnetically coupled circuits, Transformers: introduction, classification & construction of single phase transformer, emf equation and phasor diagrams.

Course Outcomes: At the end of this course, students will demonstrate the ability

1. To understand the concepts and applications of different laws used in the networks and circuits.
2. To study and analyze the D.C. Circuits with different theorems.
3. To study the concepts related to electromagnetism.
4. To study and analyze the A.C. Circuits with different theorems.
5. To understand the principle and working of transformers.

Text Books:

1. **David Bell**, Electrical Engineering Principles, PHI.
2. **Vincent Del Toro**, Electrical Engineering Principles, PHI.

Reference Books:

1. **Cotton H.,** Electrical Technology.
2. **Gupta B.R.,** Principles of Electrical Engineering.

Note for paper setter: The question paper shall comprise of 10 questions. Two questions shall be set from each Unit. The students have to attempt five questions, selecting one from each Unit.

SEMESTER-I

Course Title: Engineering Physics **Max. Marks: 100**
Course Code: CE-125 **University Examination: 60**
Duration of Exams: 3 hours **Sessional Assessment: 40**

Objective: The course is designed to acquaint the students with ultrasonic, acoustics, atomic physics, their applications and electromagnetic waves.

Unit-I

Wave Motion & Introduction to Acoustics: Longitudinal and transverse waves, transfer of energy, momentum and Intensity. Impedance offered by a string. Introduction to ultrasonic waves, magnetostriction and piezoelectric effect, productions of ultrasonic waves and their applications. A brief introduction to acoustics, Reverberation and Time of Reverberation, Sabine's Formula for Reverberation Time (qualitative treatment only). Simple related numerical problems.

Unit-II

Atomic & Molecular Physics-I: Uncertainty principle, matter waves and their characteristics properties, de-Broglie wave hypothesis and its experimental verification, photo-electric effect and Compton Effect. Bohr's quantization condition. emission & absorption spectra. Introduction to Zeeman, Paschenback and Raman's effects.

Unit-III

Atomic & Molecular Physics-II: Wave Function, Its physical significance, limitations imposed on wave function. Schrodinger's time dependent and time independent wave equations and its application to one dimensional problems. Potential steps, Potential barrier, infinite potential well and simple harmonic oscillator.

Unit-IV

Lasers: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Lasing Action, Einstein's Coefficients and Relation between them, Helium-Neon Laser, Ruby Laser, Applications of Lasers.

Unit-V

Electromagnetic Waves: Concept of Electric Field and Potential, Polarization of di-electrics, Guass's law and its applications to uniformly charged hollow sphere, uniformly charged plane sheet and cylinder, Electro Static Energy, Lorentz Force, Integral and differential Amperes law, Brief introduction to Maxwell's Equations.

Outcomes:

After the completion of the course:

1. The students will be able to explain the importance of Applied Physics in describing the technology, we are using today in different engineering fields.
2. The acquired knowledge of Waves, Vibration and acoustics will help the students to design or develop acoustically good infrastructure
3. Students will be able to use the acquired knowledge of basic Quantum Mechanics for further research applications as it can be applied to any quantum mechanical problem.
4. Students now can explain different modes of excitation involved in the working of various lasers, can answer which laser would best meet the need for an industrial or research task and have awareness regarding the safety responsibilities involved during the working with lasers.

Text Books:

1. **Pathania K. S.** & **Khera S. K.**, Waves and Vibration,
2. **Beiser**, **Arthur**, Concepts of Modern physics, TMH.

Reference Books:

1. **Ghatak A. K., Dass P.,** Laser theory & application of ultrasonic waves,
2. **David J. & Cheek**, Fundamentals and application of ultrasonic waves,
3. **Avadhanulu M. N. & Khsirsagar P. G.,** Engineering Physics (S. Chand & Co.)
4. **Vijaya K. K., Chandralingam S.**, Modern Physics, S. Chand & Co. Ltd, New Delh

Note for paper setter: The question paper shall comprise of 10 questions. Two questions will be set from each Unit .The student has to attempt five questions at least one from each Unit.

SEMESTER-I

Course Title: Engineering Chemistry & Environmental Science
Max. Marks: 100
Course Code: CE-126
University Examination: 60 Duration of Exams: 3 hours
Sessional Assessment: 40

Objective: The course is designed to acquaint the students with environmental science, water treatment and application of chemical properties of materials and alloys.

Unit-I

Environmental Chemistry: Concept of Environmental chemistry, segments of environment (a brief idea about atmosphere, hydrosphere & lithosphere), Air pollution- Introduction, Air pollutants and control of air pollution, water pollution- Introduction, water pollutants, methods of controlling water pollution.

Unit-II

Effects of Environmental Pollution: Acid rain, ozone chemistry, Green House effect & Global warming. Chemicals & metal Toxicology, Biochemical effects of Pb, Hg, As, Zn, Cd, Ni, Se, Cn & pesticides in brief on man.

Unit-III

Inorganic Chemistry materials cement & lime: Optical isomerism, racemerization, asymmetric synthesis. Water treatment; Introduction, types of water, softening of water by different processes, disadvantages of hard water, numericals on hardness of water. Introduction & classification of lime, manufacture & properties of lime, setting & hardening of lime. Cement, types of cement, manufacture of Portland cement, setting & hardening of cement.

Unit-IV

Alloys and Lubricants: Introduction, purpose of making alloys, preparation of alloys, classification of alloys, (ferrous & non-ferrous alloys), alloy steels & copper alloys.
Definition, functions of lubricants, mechanism of lubrication, classification of lubricants (lubricating oils, semi-solid lubricants, solid lubricants) synthetic lubricant, flash & fire points, oiliness, cloud & pour points.

Unit-V

Rubber and Dyes: Introduction, types of rubber, vulcanization of rubber, preparation, properties & uses of following synthetic rubber: Buna–S, Buna-N & Butyl rubber. Dyes, classification & applications of dyes.

Course Outcomes:
Upon completion of this course, the students will be able to:

1. Understand different types of pollution. Air, Noise, Water, Soil, Thermal and Radiation pollution.
2. Analyze the factors responsible for causing pollutions and effects of different kinds of pollutions.
3. Apply the methods to produce soft water for industrial use and potable water at cheaper cost.
4. Understand fundamental knowledge of the Mechanical properties of various alloy steels & copper alloys. Also comprehend mechanism of lubrication, classification and its properties.
5. Acquire the theoretical knowledge about the preparation of rubber and also gain basis of dye and basic technology of their production and application in routine practice.

Text Books:

1. **Jain & Jain**, Engineering Chemistry, Dhanpat Rai Publishing Co. 15th Ed.
2. **Sharma, B.K.,** Engineering Chemistry, Krishna Publications.

Reference Books:

1. **Bahl, B. S.**, Organic Chemistry, S. Chand & Co. Ltd, New Delhi.
2. **Soni P. L.,** Organic Chemistry, Sultan Chand and Sons.
3. **De. A. K.,** Environmental chemistry, Willey Eastern Pvt. Ltd, New Delhi.
4. **Tyagi & Mehra,** Text Book of Engineering Chemistry, Vikas Publication House.

Note for Paper Setter: The question paper shall comprise of 10 questions. Two questions will be set from each Unit. The student has to attempt five questions, selecting one from each Unit.

SEMESTER I

Course Title: Computer Fundamentals Lab **Max Marks: 50**
Course Code: CE-131 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

Note: A student is required to undergo training in the following areas:

1. Introduction to Windows.
2. MS-Office software.
3. Create, save, retrieve text file.
4. Spreadsheet program- Create, manage, and manipulate numeric data
5. Presentation software – Create presentations
6. DOS: Internal, external commands.
7. Introduction to the components of a PC.
8. Assembling of a PC.
9. Basic trouble shooting of a PC.
10. Software Installation (both system and application software's).

Lab Outcomes:

1. To formulate the algorithms for simple problems
2. To be able to correct syntax and logical errors as reported by the compilers and run time.
3. To be able to write iterative as well as recursive programs
4. To be able to represent data in arrays, strings and structures and manipulate through a program
5. To be able to declare pointers of different types and use them in defining selfreferential structures.
6. To be able to create, read and write to and from simple text files.

11.

Note: These are only the suggested list of experiments. Instructor may add or change some practical relevant to the course contents

SEMESTER I

Course Title: Basic Electrical Engineering Lab **Max Marks: 50**
Course Code: CE -132 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

List of experiments:

1. Introduction to Circuit Elements.
2. Verification of Ohms Law.
3. Verification of Kirchhoff's Current and Voltage Law (KCL & KVL)
4. Verification of Thevenin's Theorem & Norton's Theorem.
5. Transformation of Star & Delta Networks.
6. Measurement of Power using 2-Wattmeter method.
7. Verification of Superposition Theorem.
8. Verification of reciprocity theorem.
9. To plot the Resonance curve for a Series & Parallel Resonance.
10. Determination of resonance frequency using LCR Meter.

Course Out-come: Upon the completion of course, the students will be able to:

1. understand different circuit elements.
2. Verify simple electrical laws and theorems.
3. know Transformation of Star & Delta Networks.
4. Verify Superposition and reciprocity Theorem.
5. Plot the Resonance curve for a Series & Parallel Resonance.

11.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.

SEMESTER I

Course Title: Engineering Physics Lab **Max Marks: 50**
Course Code: CE -133 **University Examination: 25**
Duration of Exam: 2 hours **Internal Assessment: 25**

List of Experiments:

1. To find out the intensity response of a solar cell/photo diode.
2. To find the angle of given prism using a spectrometer.
3. To analyze the atomic spectra of Neon/Sodium lamp.
4. To determine the laser parameters like diversions, wavelength, etc for a given laser source (2 or 3 experiments)
5. To find the dispersive power of a given prism using a spectrometer.
6. To find the refractive index of a given liquid using hollow prism/glass prism.
7. Determination of wavelength of light by Newton's rings experiment.
8. To deter mine the wavelength of monochromatic light (Sodium Lamp) with the help of Fresnel's biprism.
9. To determine the focal length of two lenses separated by a distance with the help of nodal slide.
10. Young's double slit experiment.
11. To find the wavelength of light by diffraction grating.
12. To find the frequency of AC main using an electrical vibrator.
13. To plot a graph between a distance of knife edges from the centre of gravity and the period of a compound pendulum and find acceleration due to gravity from the graph.

Course Outcomes :

On Completion of this course, students can

1. Answer questions relating to the principle of Physics involved for their respective experiments.
2. Measure Vernier constant/ Least count of respective instruments and can give precise results.
3. Explain where these experiments get failed and why?
4. To plot uncertainty in their results to that of the actual values and can predict how such errors can be reduced.
5. Learn safety rules in the practice of laboratory investigations.

Note: These are only the suggested list of experiments. Instructor may add or change some experiments relevant to the course contents.