



**Subject Code:** - MAT080

**Subject Name:** - Engineering Mathematics – II

**Semester:-** II

L	T	P	C
4	-	-	4

**Course objectives:**

The objective of this course is to fulfill the needs of students. It covers Coordinate geometry and Coordinate systems, Vector algebra, Differential calculus, Integral calculus, Differential equation in order to acquire mathematical knowledge and to solving a wide range of practical problems.

**Co- Ordinate Geometry and Co-ordinate System:** Cartesian and Polar, Distance, Division, Area of a triangle. Locus of a point and its equation. The slope of St. Line Angle between two St. Lines. Parallel and perpendicular St. lines. Standard and general equation of St. Line. Point of intersection of two St. Lines.

**Vector Algebra:** Concept of Vector and Scalar Quantities. Different types of vectors. Addition and subtraction of vectors. Components of a vector Multiplication of two vectors Scalar Product Vector Product Applications (Work done, power & reactive power).

**Differential Calculus:** Define constant, variable, function. Value of the function. Concept of limit of a function. Definition and concept of differential coefficient as a limit. Standard results. Derivatives of sum, difference, product, quotient of two functions. Diff. coeff. of function of a function. Diff. coeff. of implicit function. Logarithmic Differentiation. Differential coeff. of Parametric function.

**Integral Calculus:** Definition as a inverse process of differentiation. Standard Results (including inverse function). Methods of Integration Substitution. Integration by parts breaking up into partial fraction Concept of Definite Integral.

**Differential Equation:** Concept of formation of Differential Equation. Solution of first order differential equation (Variables separation, Homogeneous differential Equation, Linear Differential Equation).

**Course outcomes:**

The curriculum is designed to satisfy the diverse needs of students. Coursework is designed to provide students the opportunity to learn key concept of applications of mathematics in the field of Engineering. Student will learn about the basic application of mathematics in various practical problems and further uses.

**References:**

1. Co-ordinate Geometry S. L. Loni.
2. Differential Calculus Gorakh Prasad.
3. Integral Calculus Gorakh Prasad.
4. Engineering Mathematics (M.P. Hindi Granth Akadami) Dr. S.K. Chouksey & Manoj Singh.
5. Higher Engineering Mathematics, B.S. Grewal Khanna Publication.



**Subject Code:** - PHY020

**Subject Name:** - Engineering Physics-II

**Semester:-** II

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>2</b>	<b>5</b>

**Course Objectives:**

The subject deals with the principles of thermo electricity, Sound, Optics its applications in the field of modern engineering field.

**Thermoelectricity:** Heating effect of electric current: Joule’s law, work energy and power in electric circuit, Calculation of electric energy, Thermo electricity, Seeback effect and thermoelectric power, Neutral temperature, temperature of inversion and relation between them, Thermo electric thermometer and thermo couples.

**Sound:** Production of sound waves (Longitudinal and transverse waves), Progressive and stationary waves, Basic knowledge of refraction reflection, interference and diffraction, Ultrasonic, Audible range, Production of ultrasonic, properties and uses.

**Optics and Optical Instruments:** Refraction, critical angle and total internal reflection, Refraction through lenses and problems, Power of lenses, Spherical and chromatic aberrations, Simple and compound microscope, telescope and derivation for their magnifying power.

**Electrostatics and Electromagnetic Induction:** Coulomb’s law, Electric field intensity, potential, Capacity, principle of capacitor types of capacitor, combination of capacitors, Electromagnetic Induction: Faraday’s law, Lenz’s law, Self and mutual inductance, Transformer and electric motor, Induction coil.

**Modern Physics:** Photoelectric effect, threshold frequency, Einstein- equation, Photo electric cells, Radioactivity: decay constant, Half life, mean life, Properties of nucleus, nuclear mass, mass defect, Production of x-rays, properties and its uses, Thermal emission.

**Basic Electronics:** Semiconductors: Introduction, Types of semiconductors, Explanation of conductor, semiconductor and insulators on the basis of band theory, P-N junction, diode as rectifier.

**Course outcomes:**

The understanding of student about applications of principles of Physics in the various disciplines of engineering will be enhanced.

**References:**

1. Applied Physics Vol. 1 & 2 - Saxena and Prabhakar.
2. Physics - Tti Publication.
3. Physics Vol. 1 & 2 - Halliday and Resnic R.
4. Engineering Physics- Gaur and Gupta.
5. Principle of Physics- Brij Lal & Subramanyan.
6. Physics for Technical Education- Ls Zednov.
7. Bhautiki- Deepshri Gupta.
8. Physics- Deepshri Gupta.

**Suggested List of Experiment:**

1. Focal length of a convex lens by u-v method.
2. Refractive index of prism (spectrometer).
3. Refractive index of prism ( I-d ) curve
4. Verification of Newton's cooling law.
5. Surface tension by Capillary rise method.
6. To find out unknown resistance by meter bridge.
7. Coefficient of Thermal conductivity by searl's method.
8. Verification of Newton's cooling law.



**Subject Code:** - CHE020

**Subject Name:** - Engineering Chemistry

**Semester:-** II

L	T	P	C
3	1	2	5

**Course Objectives:**

Modern development of industries requires more understanding of materials required for engineering and industrial purposes. This part of chemistry explains various aspects with regard to petroleum, fuels, environment, catalyst, metals and alloys and polymers. This subject will develop basic understanding and skill of diploma Students.

**Unit: I**

**Petroleum:** Introduction, Occurrence, Composition of petroleum, Origin, Classification of petroleum, refining of petroleum, purification of petroleum, Flash point, Knocking, Octane number.

**Coal and Fuel:** Types, composition, Structure, classification and properties of coal, calorific value of coal, analysis of coal. Types of fuel, advantages and disadvantages, combustion of fuels, calorific value, specification for oils.

**Boilers:** Types of boilers, and their functioning, Heat transfer, heat exchanges shell and tube, finned tube heat exchanges plate, heat exchanges refrigeration cycles.

**Unit: II**

**Catalysis:** Introduction, Types: Homogeneous and Heterogeneous catalysis, Basic Principles of catalysis, Mechanism of catalysis, Factor affecting the catalysis reaction, Industrial uses of catalysis reaction.

**Surface chemistry:** Sols, Gels, Emulsion.

**Unit: III**

**Metals and Alloys:** Physical and chemical properties of metals, copper, iron, aluminum, tin, nickel. General principal of metallurgy, minerals/ ores, ore dressing, roasting ,smelting, Explanation of alloying purposes, methods of alloying, composition and uses of alloy like brass, bronze, duralium, German silver, gun metal, solder, stainless steel, casting and bearing alloy.

**Inorganic materials of industrial importance:** their availability, forms structure and modification, alumina, silica, silicates, clay, mica, carbon, zeolites.

**Drying:** Introduction, Equipments – tray dryer, rotary dryer, drum dryer, spray dryer.

**Unit: IV**

**Solid waste management:** industrial safety, removal of solid contaminants from waste water by coagulation, fuel palatalization, soil conditioning and green house effect, ozone depletion, carbon credits, principle and equipments of aerobic, anaerobic treatment such as adsorption, filtration, sedimentation, and bag filters.

**Unit: V**

**Water Treatment:** Introduction, Physical and chemical property of water, Hardness of water and their types, Disadvantages of hard water, Different methods used for removing hardness of water, Scale and sludge. Specification for Industrial use, various water treatments.

**Steam:** Generation and use, **Air:** specification for industrial use, processing of air.

**Fluid flow:** Fans, blower, compressors, vacuum pumps, gear pumps, centrifugal pumps.

**Unit: VI**

**High Polymers and Rubber:** Polymerization and condensation, classification of plastics, Compounding and Moulding constituents of plastics. Preparation Properties and uses of PVC, polythene, polystyrene, poly-amides, polyesters, Bakelite. Synthetic fibers, nylon, rayon, Dacron, and polyesters. Idea about rubber and vulcanization.

**Lubricants:** Meaning, type and theory of lubricants, properties of a good lubricants, Flash and fire point and cloud point, emulsification number, viscosity.

**Course Outcomes:**

Students would be able to understand the applications of chemistry in field of industries and they would be more proficient to select more appropriate material for different purposes. They will learn various techniques of water treatment.

**References:**

1. Engineering Chemistry, Jain & Jain.
2. Physical Chemistry, Bahl and Tuli.
3. Inorganic Chemistry, Satyaprakash.
4. Applied Chemistry, Dr. G. C. Saxena, Deepak Prakashan, Gwalior.
5. Polymer Chemistry, O. P. Mishra.
6. Applied Chemistry, H. N. Sahni, Deepak Prakash.
7. Industrial chemistry, B. K. Sharma
8. Environmental Chemistry, B. K. Sharma & A. K. Day

**Suggested List of Experiment:**

1. To identify one Anion and Cation in a given sample.
2. Determination of flash point and fire point of a given sample of oil by Abel's apparatus.
3. Determination of viscosity by Red Wood Viscometer no. 1 and no.2.
4. Determination of hardness of water by EDTA Method.
5. Determination of solid content in the given sample of water.
6. Determination of percentage of moisture in the given sample of coal by proximate analysis.
7. To determine the percentage of iron in a given sample of alloy by Redoximetry titration.
8. To determine strength of ferrous ammonium sulphate by redoximetry titration.



**Subject Code:** - MEC050

**Subject Name:** - Engineering Graphics

**Semester:** II

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>2</b>	<b>1</b>	<b>4</b>	<b>5</b>

**Course Objectives:**

Engineering Technician irrespective of his field of operation in an industry is expected to possess a reasonable understanding of drawing which includes clear spatial visualization of objects and the proficiency in reading and interpreting a wide variety of engineering drawings. An engineer is also expected to possess certain degree of drafting skill. This course of engineering drawing for diploma courses is aimed at developing basic knowledge and skills of engineering drawing.

**Introduction to Drawing Instruments:** Introduction of drawing instruments, materials and their uses. Planning lay-out of drawing sheet. Conventional representation of the common Engineering materials, electrical installations and fittings, Electronics components, sanitary fittings, Mechanical components.

**Lines, Lettering and Dimensioning:** Introduction of type of lines and their applications, dimensioning, type of dimensioning.

**Geometrical Constructions and Engineering Curves:** Divide a line into any number of equal parts by parallel line method, bisecting of line and angle, construction of pentagon and hexagon.

**Introduction of conic section:** Construction methods of Ellipse, Parabola, Hyperbola. - Construction of Cycloidal curves, involutes curves.

**Scales:** Introduction of scales and their applications, Types of scales, Representative fraction, Construction of plain and diagonal scales.

**Orthographic Projection:** Definition of projection, Planes of projection, Quadrants, first & third angle projection method. Projection of points in all the four quadrants. Projection of lines, line parallel to HP and VP both, line perpendicular to one plane and parallel to other, line inclined to one plane and parallel to other, knowledge of projection of line inclined to both the planes.

**Projection of Plane:** Projection of planes, Perpendicular to HP and VP both, Perpendicular to one plane and parallel to other, Inclined to one plane and perpendicular to other, Knowledge of projection of plane inclined to both the planes.

**Projections of Solids:** Projection of cylinder, cone, prism and pyramid for conditions, Axis parallel to HP and VP, Axis perpendicular to HP and parallel to VP, Axis perpendicular to VP and parallel to HP, Axis inclined to HP and parallel to VP, Axis inclined to VP and parallel to HP.

**Section of Solids And Development Of Surfaces:** Section of cone, cylinder, prism and pyramid with different orientation. Introduction to development of lateral surface of solids- Cone, Cylinder, Prism and Pyramids Under the condition – solid resting on its base in the HP and axis perpendicular to HP and parallel to VP.

**Isometric Views:** Concept of isometric projection and isometric view, Construction of isometric scale-Construction of isometric view of polygon and circle.

**Course Outcomes:**

The learning which will be imparted to the students studying this subject.

- Ability to create Geometric Construction with manual drawing instruments.
- Ability to create Section views.
- Ability to create Dimensions.
- Ability to solve Traditional Descriptive Geometry problems.
- Ability to generate Engineering Drawings from models
- Understanding of concepts of 2D and 3D Projections and ability to draw Orthographic projections of Lines, Planes, and Solids and engineering applications of this technique.

**References:**

1. Engineering Drawing by– N. D. Bhatt.
2. Engineering Drawing by– R. K. Dhawan.
3. Engineering Drawing by– P. S. Gill.
4. First Year Engineering Drawing by – A. C. Parkinson.



**Subject Code:** - MEC070

**Subject Name:-** Workshop Technology

**Semester:-** II

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	<b>4</b>	<b>2</b>

**Course Objectives:**

Workshop technology is the backbone of industries it helps to develop and enhance relevant technical skills and provides ability to work using tools and equipments required by the Engineers in the various engineering industrial sectors, manufacturing processes and workshops. The on hand training is imparted to the students to develop skills and understanding with applications of basic principles in the practical field.

**Introduction:** Introduction to workshop, prepare lay out of workshop, general safety rules of workshop, prepare a list of general safety rules to be followed in workshop.

**Fitting Shop:** Introduction to fitting shop, List the Commonly used Metals, Alloys, type of operations performed in fitting shop, fitting tools as marking tools, Clamping devices, striking tools, cutting tools etc. , screw threads, common types of screw threads & the terminology used.

**Carpentry Shop:** Introduction to carpentry shop, type of jobs produced in carpentry shop, commonly used raw material; know commonly used raw materials & their commercially available size.

Carpentry tools: various carpentry tools with their specifications and uses e.g. different saws, chisels, gauges, scales, hammers, tri squares, planners, vice etc.

Carpentry Joints:- Introduction of various joints like T, corner, mortise & tennon joints, dovetail, pin, cross half lap joint etc.

**Black Smithy Shop:** Introduction to black smithy & forging shop, commonly used raw materials: - M.S. Bars of different shapes and size. Smithy Tools: - Know various smithy tools with their specifications e.g. different type of hammers, hot / cold chisel, flatters, tongs, leg vice, swage block, anvils, open hearth and furnaces etc.

**Welding & Sheet Metal Shop:** Introduction to welding shop, types of welding, tools & equipments used:-specifications & use of various tools and equipments used in Welding shop e.g. A.C. welding transformer, Gas welding set, electrode used, chipping hammer, wire brush, shield, gloves, apron etc. Sheet working tools and operations.

**Moulding Shop:** Introduction to shop, types of sands, green sand composition, pattern, types of pattern, allowances, moulding tools and their uses.

**Course Outcomes:**

This course intends to impart basic knowledge of various hand tools and their use in different Sectors of manufacturing.

- The workshop experiences would help to develop the understanding of the complexity of the industrial job, along with time and skills requirements of the job
- Irrespective of branch, the use of workshop practices in day to day industrial as well domestic helps to provide solutions to the technical problems.
- Select the appropriate tools and materials required for specific technical operation.



- Comprehend the safety measures required to be taken while using the tools.

**Suggested List of Experiment:**

1. To study of Fitting Shop, tools, equipments, operations and safety measures.
2. To prepare a job in fitting shop with the applications of various fitting operations.
3. To study of Carpentry Shop, tools, equipments, operations and safety measures.
4. To prepare a T -Halving Joint with soft wood by various operations of carpentry.
5. To study of Black Smithy Shop, tools, equipments, operations and safety measures.
6. To prepare Chisel/J hook with the application of hot working in smithy shop.
7. To study of Welding and Sheet Metal shop, tools, equipments, operations and safety Measures.
8. To prepare a V-Butt joint welding Joint with the help of A. C. Arc Welding.
9. To study of Moulding shop, tools, equipments, operations and safety Measures.
10. To prepare a Green Sand Mould for a given single piece pattern.

**References:**

1. Workshop technology vol. I by- Hazra & Chaudhary.
2. Production technology vol. I by- R.C. Patel &C.G. Gupta.
3. Production technology vol. I by- Dalela.
4. Work shop technology vol. I by- Raghuwanshi.
5. Work shop technology vol. I by – Chapman.
6. Workshop Vol. I . - P. N. Vijayvargiya (Hindi medium).



**Subject Code:** - CSS090

**Subject Name:-** Communication Skills

**Semester:-II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>-</b>	<b>4</b>	<b>3</b>

**Course Objectives:**

Communication skills are important for many professions but are crucial for students to develop their personality. They must be able to adapt their methods of communication to all regardless of ability or learning style.

- Students will demonstrate competency in communication skills related to production and presentation of messages and documents in multiple formats.
- Students will demonstrate competency in critical thinking skills related to the analysis, interpretation, and criticism of any message either verbal or non-verbal.
- Students will demonstrate an understanding of multiple theoretical perspectives and diverse intellectual traditions in formal and informal communication.
- Students will demonstrate competency in the analysis and practice of ethical communication.
- Students will demonstrate understanding to the importance of free expression and the responsibilities it entails.

**Unit: I - Grammar & Vocabulary:** Parts of Speech, Determiners, Tenses, Subject-Verb Agreement, Active and Passive Voice, Reported Speech, Punctuations.

Vocabulary: Affixation, Antonyms, Synonyms, one-word substitute, Phrasal Verbs, Idioms, and Jargons.

**Unit: II - Communication Process and its Need:** Meaning of communication, Process of communication, Importance of communication, Types of communication, Seven C's of communication, Barriers in communication and Removal of Barriers.

**Unit: III - Business Communication:** Principles of Effective Business Correspondence: its parts, mechanics, style and forms, Letter of Enquiry, Letter of Placing an Order, Letter of Complaint, Letter of Adjustment, Email Writing.

**Unit: IV - Composition and Translation:** Developing Paragraphs, Précis Writing, Essay Writing, Unseen Passages, Translation.

**Unit: V - Employability Skills:** Job Application, Interview skills, Group Discussion, Teamwork, and Leadership.

**Course Outcomes:**

- Students will be enriched with good vocabulary and diction.
- Students will be able to comprehend the process of communication and its components.
- Students will be able to improve the language skills such as Listening, Speaking, Reading and Writing.
- Students will be able to enhance phonetic competence, comprehension skills, presentation skills, soft skills etc.

**References:**

1. Business Correspondence and Report Writing – By Sharma; TMH
2. Living English structure – By W.S. Allen; Longmans
3. English Grammar- Ehrlich, Schaum Series, TMH
4. Spoken English for India – By R.K. Bansal and IB Harrison orient Longman
5. New International Business English – John and Alexander
6. Effective Technical Communication – Rizvi , TMH.