

**COURSE STRUCTURE AND SYLLABUS FOR THREE YEARS
DIPLOMA IN ENGINEERING TECHNOLOGY
(COMMON TO ALL BRANCHES)**



CENTRAL INSTITUTE OF TECHNOLOGY
(DEEMED TO BE UNIVERSITY, MHRD, Govt. Of India)
Kokrajhar, B.T.A. D., Assam-783370

COURSE STRUCTURE

1st AND 2nd SEMESTERS

1ST SEMESTER

S.N	Course Code	Subject	L	T	P	Credit
1	DHSMC-101	Communication in English-I	3	0	0	06
2	DCH-101	Chemistry-I (THEORY)	2	1	0	06
3	DCH-171	Chemistry -I (PRACTICAL)	0	0	2	02
4	DMA-101	Mathematics-I	4	1	0	10
5	DME-101	Engineering Drawing	2	0	2	06
6	DME-171	Workshop Practice	0	1	6	08
7	DPH-101	Applied Physics - I (THEORY)	2	1	0	06
8	DPH-171	Applied Physics - I (PRACTICAL)	0	0	2	
Total Credit						46

2ND SEMESTER

S.N	Course Code	Subject	L	T	P	Credit
1	DHSMC-201	Communication in English-II	3	0	0	06
2	DCH-201	Chemistry-II	2	1	0	06
3	DCH-271	Chemistry -II (PRACTICAL)	0	0	2	02
4	DMA-201	Mathematics-I	4	1	0	10
5	DME-201	Engineering Mechanics	3	1	0	08
6	DPH-201	Applied Physics - II	2	1	0	06
7	DPH-271	Applied Physics - II (PRACTICAL)	0	0	2	02
Total Credit						40

SEMESTER- I

1. Course Title: COMMUNICATION IN ENGLISH-I

2. Course Code: DHSMC: 101

3. Aim of the course:

The general aim of a course in English language and communication is aimed at the three domains of learning: knowledge, skills and attitudes. In keeping up with this aim, it is attempted to develop all the four skills of language learning in the learner – listening, speaking, reading and writing and also to enable the students to use the grammar of the English language correctly. Since, all these four skills are interrelated to each other, this course is aimed at achieving language proficiency in all the four skills so that at the end of the course the student is a confident user of the General Indian English (GIE), with the added knowledge of the other variants as British English and American English. This, it is attempted to achieve, by building a carefree, tension free classroom atmosphere in which the language classes incorporate activities related to these four skills. It is aimed that at the end of the course, the student can relate to the English language as a language of communication and conduct of everyday affairs.

4. Course outcome:

On completion of the course on Communication in English-I, student will be able to

- CO1 = Comprehend basic sentences in English.
- CO2 = Construct grammatically correct sentences in English.
- CO3 = Use grammatically correct English sentences in everyday situations.
- CO4 = Use varied English vocabulary in everyday situations confidently.
- CO5 = Conduct themselves orally using simple English.

Chapter no.	Chapter Title	Content / area of focus	Intended Learning Outcome	Durati on in hours
1.	Parts of Speech	1.1 Recognition and review of Nouns, Pronouns, Verbs, Adverbs, Adjectives, Prepositions, Conjunctions, Interjections 1.2 Knowledge of Subject, Object and Compliment of the Verb 1.3 Verbals –Infinitival, Gerund and Preposition	1. Explain the different parts of speech. 2. Describe the various parts of sentence.	3
2.	Prepositions of time and place	2.1 Contextual teaching of prepositions of time - on, in , at, since, for, ago, before, to, past, to, from, till/until, by 2.2 prepositions of place: in, at, on, by, next to, beside, near, between, behind, in front of, under, below, over, above, across, through, to, into, towards, onto, from	1. Explain prepositions of time and place.	5
3.	Clause,	3.1 Basic definitions of clauses	1. Describe the various	2

	phrases and Relative Clauses	and phrases 3.2 Focus on Relative Pronouns and their use in sentences as relative clauses	types of clauses and phrases with special reference to relative clauses.	
4.	Subject Verb Agreement	4.1 Rules that guide the agreement of the subject to its verb	1. Explain subject verb agreement.	5
5.	Sentence types and Transformation of sentences	5.1 Assertive sentences, Exclamatory sentences, Interrogative sentences, Negative sentences, Compound sentences, complex sentences, simple sentences, Degrees of Comparison	1. Describe the various types of sentences and their transformations.	5
6.	Voice	6.1 Change from Active Voice to Passive Voice and vice versa	1. Describe Voice.	3
7.	Punctuation	7.1 Use of the comma, semi-colon, colon, apostrophe, exclamation mark, question mark and quotation marks	1. Explain punctuation in different situations and sentences.	5
8.	Word formation	8.1 Change of one part of speech to the other: from Verbs to Nouns, Nouns to Verbs, Adjectives to Nouns, Nouns to Adjectives, Verbs to adverbs, and Adverbs to Verbs	1. Explain the conversion of one part of speech to the other.	2
9.	Affixation	9.1 Prefixes and Suffixes and new word formations	1. Explain the use of various Affixes and the change of meaning with it.	2
10.	Nominal Compounds	10.1 Common nominal compound	1. Describe how different nouns can come together to form a new word.	2
11	Paragraph Writing	11.1 Descriptive Paragraph on various related topics.	1. Describe how to write coherent paragraphs in related words.	5

BOOKS RECOMMENDED:

1. *Essential English Grammar with Answers* by Raymond Murphy (Cambridge University Press)
2. *English for Polytechnics* by Dr Papor Rani Barooah (Eastern Book House Publishers)
3. *English Grammar* by Annie Brinda (Cambridge University Press)

SEMESTER - II

1. Course Title: COMMUNICATION IN ENGLISH-I I

2. Course Code: DHSMC: 201

3. Aim of the course:

The general aim of a course in English language and communication is aimed at the three domains of learning: knowledge, skills and attitudes. In keeping up with this aim, it is attempted to develop all the four skills of language learning in the learner – listening, speaking, reading and writing and also to enable the students to use the grammar of the English language correctly. Since, all these four skills are interrelated to each other, this course is aimed at achieving language proficiency in all the four skills so that at the end of the course the student is a confident user of the General Indian English (GIE), with the added knowledge of the other variants as British English and American English. This, it is attempted to achieve, by building a carefree, tension free classroom atmosphere in which the language classes incorporate activities related to these four skills. It is aimed that at the end of the course, the student can relate to the English language as a language of communication and conduct of everyday affairs.

4. Course outcome:

On completion of the course on Communication in English-II, student will be able to

- CO₁ = Comprehend meaning of a passage in English.
- CO₂ = Arrive at the gist of a passage and also write the gist in one's own words.
- CO₃ = Understand the differences between general English and official English.
- CO₄ = Face an interview with confidence and fluency and a positive attitude.

Chapter no.	Chapter Title	Content / area of focus	Intended Learning Outcome	Duration in hours
1.	Letter Writing	1.1 Formal letter formats, greetings, salutation, body of the letter, practice of letter writing in different situations: Order letter, Complaint letter, Letter of Adjustment, Quotation letter, Letter to the Editor, Application for leave of absence	1. Explain how to write different types of formal letters	5
2.	Job Application and Cover Letter, Resume, Curriculum Vitae, bio data	2.1 Format of a job application, Cover Letter, formats of Resume and CV for a fresher and for someone with experience, Differences between Resume, CV, Bio-data, and choice of referees	1. Explain how to write Job Applications, Cover Letter, Resume, Curriculum	5

			Vitae, bio data	
3.	Paragraph Writing	3.1 Definition, Cohesion and Linkage using Transition words on everyday topics	1. Describe how to compose coherent passages.	3
4.	Summary writing	4.1 Definition, Use of Transition words, important points to remember while summarizing	1. Explain how to arrive at a summary of a paragraph / text.	2
5.	Reading Comprehension	5.1 Developing the comprehension skill of the students and the ability to reproduce grammatically and semantically correct English sentences	1. Describe how to comprehend passages for understanding.	2
6.	Memo Writing	6.1 Definition and format	1. Explain how to write a formal Memo.	2
7.	Amplification	7.1 Definition and format	1. Explain how to write a formal memo	2
8.	Report writing	8.1 Definition, types of reports with a focus on annual report, non-profit annual report, technical and academic report, necessity and purpose of writing a report, qualities of a good report, language used in a report, different formats of reports and sample reports	1. Explain how to write a formal report for office correspondence.	2
9.	E- mail writing	9.1 writing the perfect e-mail, steps to the perfect e-mail, formal and informal greetings, requests through an e-mail, writing an apology, complaint and seeking help and information in an e-mail, informing about a file attached in in an email, writing the formal ending of an e-mail	1. Explain how to write formal and informal emails.	2
10.	Facing an interview and dress code	10.1 How to approach, what to speak, how to speak in an interview and answer interview questions, the business etiquettes to maintain, body language , negative body language, handling an awkward situation in an interview, the	1. Discuss how to face an interview for success.	3

		perfect handshake, points to remember while applying for a job		
11.	British English and American English	10.1 Difference between American and British English words – vocabulary and spelling	1. Distinguish between British English and American English.	2

BOOKS RECOMMENDED:

1. *Student's handbook of Written English and Phonetics* by Dr Papori Rani Barooah (Eastern Book House Publishers)
2. *Strengthening your writing* -V.R. Nayaranswami (Orient Longman)

SEMESTER - I

Course Title: Chemistry-1

Course code: DCH101

Unit I: Kinetic theory of gases

(6L)

Postulates of kinetic theory, Pressure volume correlations, Numerical problems, Liquefaction of gases – Thomson effect, Claude's Method and Linde's Method.

Unit II: Electrochemistry

(6L)

Electrolytes, Faraday's law of electrolysis, Numerical problems, application of electrolysis, oxidation and reductions, Redox reactions.

Unit III: States of Matter(6L)

Solid, liquid, gas. Boyle's law, Charles's Law, Avogadro's law, Ideal gas equations, numerical problems.

Unit IV: Periodic table, Atomic structure(6L)

Electrons, protons, neutron, Atomic mass (A), atomic number (Z) isotopes, isobars, isotone, orbit and orbitals, electronic configuration (upto Z=40), Modern periodic table, groups and periods.

Unit V: Organic chemistry-I

(6L)

IUPAC nomenclature, Alkane, alkene, alkyne, alcohol synthesis and applications.

Unit VI: Biochemistry(4L)

Carbohydrates, lipids, amino acids, proteins, Nucleic acid--- DNA and RNA, Vitamins and hormones --- sources and application.

Unit VII: Environmental Chemistry

(6L)

Defination, Types of pollution, pollutants, Water quality measurements- D.O, B.O.D, C.O.D, hardness, TDS, Green house effect, acid rain, Ozone layer depletion.

Course Title: Chemistry-1(PRACTICAL)

Course code: DCH171

Experiment-1: Aim of the experiment: Introduction to chemistry laboratory, precautions, name of common chemicals, apparatus, instruments etc.

Experiment-2: Aim of the experiment: Volumetric analysis and study of apparatus used therein.

Experiment-3: Aim of the experiment: Determine the degree of temporary hardness of water by EDTA titration.

Experiment-4: Aim of the experiment: Determination of solubility of a solid at room temperature.

Experiment-5: Aim of the experiment: To verify the first law of electrolysis (electrolysis of copper sulphate solution using copper electrode).

Experiment-6: Aim of the experiment: Determination of pH of unknown solutions.

Text/Reference Books:

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan.

SEMESTER - II

Course Title: Chemistry-1I

Course code: DCH201

Unit I: Organic chemistry-II(5L)

IUPAC nomenclature, alcohol, carbonyl compounds. Aromaticity, nonaromaticity, anti-aromaticity, Benzene and its derivatives, synthesis and applications.

Unit II: Polymer and polymerization

(5L)

Types of polymer, thermoplastic and thermosetting plastic, preparation and applications of PE, PVC, PP, Perpex, Teflon, Bakelite, nylon, Natural rubber, Synthetic rubber.

Unit III: Metallurgy(7L)

General principles of metallurgy, minerals, ore, gangue, slag, flux, roasting, calcination etc. Metallurgy of iron and aluminium, Manufacture of steel by Bessemer process, open hearth process and LD process, alloys.

Unit IV: Acidimetry and alkalimetry(6L)

Equivalent mass of acids, bases, oxidizing agent, reducing agent. Redox reactions, Normality equations, Numerical problems.

Common ion effect, Buffer solutions, Titrations, Indicators.

Unit V: Building materials(5L)

Portland cement, Types of manufacturing, setting and hardening of cement, special cement. Glass, Bricks.

Unit VI: Lubricant

(2L)

Definition, classification of lubricants, important functions of lubricants.

Unit VII: Industrial chemistry(5L)

Ethanol manufacture from starch by fermentation, Fuels- Classifications, calorific values, natural gas, water gas, producer gas, LPG, power alcohol. Petroleum- refining, octane number, cetane number.

Unit VIII: Water treatment(5L)

Hardness of water, types of hardness, temporary and permanent hardness, removal of hardness

Course Title: Chemistry-1(PRACTICAL)

Course code: DCH271

Experiment-1: Aim of the experiment: To determine the coefficient of viscosity of the alcohol by using Ostwald's viscometer.

Experiment-2: Aim of the experiment: To determine the surface tension of the given liquid with respect to water at room temperature by using Stalagnometer.

Experiment-3 Aim of the experiment: Preparation of standard solution of Na_2CO_3

Experiment-4 Aim of the experiment: Determination of strength of NaOH by titrating with 0.1 N HCL

Experiment-5: Aim of the experiment: To identify acid radicals by dry and wet tests.

Experiment-6 Aim of the experiment: To identify basic radicals by dry and wet tests.

Text/Reference Books:

1. S. Chawla, *A Text Book of Engineering Chemistry*, DhanpatRai Publishing Co.
2. Jain and Jain, *Engineering Chemistry*, DhanpatRai Publishing Co.
3. V.R. Gowariker, N.V. Viswanathan, J. Sreedhar, *Polymer Science*, New Age International Publisher.
4. S.K. Ghosh *Advanced General Organic Chemistry (A Modern Approach) (Set I & II)* NCBA Publisher, New Delhi, 2009
5. B. Viswanathan, P. S. Raghavan, *Practical Physical Chemistry*, Viva
6. Dr. S. Rattan, *Experiments in Applied Chemistry*, S. K. Kataria & Sons.

Justification for both theory and practical syllabi:

Now a days, chemicals and chemical products are playing important role in the field of biotechnology, engineering, agriculture and pharmacology etc. and use of chemical materials & its applications are increasing exponentially. Therefore, Chemistry –I& II (Theory and practical) syllabi for diploma students are designed for physical, organic and biochemistry related materials to enhance their scientific temper and appreciations, and to help them to correlate between chemistry with other engineering subjects like Foods, Civil, ECE etc.

SEMESTER- I

Course Name: Mathematics – I

Course Code: DMA101

1. ALGEBRA (18 HOURS)

- Vector and Scalar quantities – types of vectors, geometric representation of vectors, addition and subtraction of vectors, magnitude of a vector, product of a vector by a scalar, unit vectors i, j, k .
- Arithmetic and geometric progressions – n th term of A.P. and G.P., Geometric mean between two numbers.
- Complex numbers – origin, general form, polar form, examples.
- Binomial theorem – Factorials, positive integral values, binomial expansion, rules, calculation of appropriate value.
- Logarithm and exponential series.
- Determinants: Definition, operations and Cramer's rule for solving simultaneous linear equations.
- Basic concepts of permutation and Combinations.

2. TRIGONOMETRY (10 HOURS)

- Trigonometric functions and ratios.
- Trigonometric functions of allied angles – half, double, triple, compound angles.
- Addition and subtraction formulae.
- Solution of triangles using properties.
- Simplification of trigonometric expressions using different formulae.
- Basic concept of inverse trigonometric functions and hyperbolic functions.

3. CO-ORDINATE GEOMETRY (12 HOURS)

- Co-ordinate Systems, cartesian and polar co-ordinates, distance between two points, section formula, area of triangle, collinearly and co-planarity.
- Straight Line: Definition, general and standard form of equations, intersection of straight lines: angle between them, bisector of angle between them.
- Change of co-ordinate axes, shifting of origin and rotation of axes.
- Circle: Standard equations and simple problems, tangent and normal.
- Basic idea of parabola, ellipse and hyperbola, their standard equations and basic properties.

Reference Books:

Sl. No.	Title	Author/ Publisher
1	Mathematics for Polytechniques: Vol – I&II	TTTI, Bhopal
2	Mathematics for Polytechniques	S.P. Deshpande
3	Engineering Mathematics	I.B. Prasad
4	Engineering Mathematics	Grewal
5	Plain Trigonometry	Bansilal
6	College Algebra	Shah and Desai
7	Mathematics Textbook for class XI and XII	NCERT

SEMESTER - II

Course Name: Mathematics – II

Course Code: DMA201

UNIT I: CALCULUS-I (22 HOURS)

Differential Calculus

- Sets: Definition, types and operation on Sets.
- Relation: Definition, domain and range, equivalence relation.
- Functions: definition, types of functions.
- Limits: Concept and evaluation of limits, indeterminate forms, L'Hospital's Rule.
- Differentiation: Differentiation by first principle. Differentiation of sum, product and quotient, function of function, Chain rule. Differentiation of trigonometric, inverse trigonometric, hyperbolic, logarithmic and parametric functions, applications.

Integral Calculus

- Integration: Definition and fundamental properties.
- Methods of integration – integration by substitution, by parts, partial fractions
- Applications

UNIT-II: STATISTICS (12 HOURS)

- Introduction: Bar Diagram, Histogram, and frequency polygon.
- Measures of Central Tendency: Simple and weighted arithmetic means, mean median and mode and empirical relationship between them. Harmonic mean.
- Measures of Dispersion: Range, Mean Deviation, Standard Deviation, Quartile deviation.
- Correlation

UNIT-III: MATRICES (6 HOURS)

- Definition, Operation of matrices.
- Special Matrices – Square, diagonal, row, column, zero or null, unit matrix, upper and lower triangular, symmetric and skew – symmetric matrices.
- Adjoint of a matrix, inverse of a matrix, finding inverse using adjoints and elementary transformations.
- Rank of a matrix.
- Solution of simultaneous linear equations.

Books for reference:-

Sl. No.	Name of the books	Author/Publisher	Edition/Year
1.	Mathematics for Polytechniques	TTTI, Bhopal	Latest
2.	Mathematics for Polytechniques	S. P. Deshpande	Latest
3.	Engineering Mathematics	I.B. Prasad	Latest
4	A text Book Matrices	Shanti Narayan, S. Chand & Co. New Delhi	1998
5	Introduction to Statistics	L. Choudhury, KitapGhar, Guwahati.	Latest
6	Fundamental of Statistics	Kapoor & Gupta	Latest
7	Mathematics Textbook for class XI and XII	NCERT	Latest

SEMESTER - III

Course Name: Mathematics-III

Course Code: DMA301

Unit- I: CALCULUS-II (14 HOURS)

Differential Calculus:

- Functions of several variables.
- Partial differentiation, Partial differential Coefficients.
- Homogeneous functions, Euler's theorem on homogeneous functions,
- Total differential coefficients,
- Change of variables.
- Maxima and Minima (functions of two variables)

Integral Calculus:

- Improper integrals (definitions, example and simple problems).
- Beta and Gamma function, relation between Beta and Gamma functions and related problems.

Unit- II: Ordinary differential equations (ODE): (16 HOURS)

First Order ODE:

- Formation of differential equations.
- Separable equations.
- Equations reducible to separable form.
- Exact equations.
- Integrating factors
- Linear first order equations; Bernoulli equation.
- Orthogonal Trajectories.

Second Order ODE:

- Homogenous linear equations of arbitrary order with constant coefficients.
- Non homogenous linear equations with constant coefficients.
- Euler's and Cauchy's equations.
- Method of variation of parameters.
- System of linear differential equations.

Unit- III: Vector Calculus: (10 HOURS)

- Introduction to vector Calculus.
- Scalar field and vector field.
- Derivative and integration of vector functions.
- Partial derivative of vectors.
- Directional derivatives.
- Tangent plane and normal to a level surface.
- Gradient, divergence and curl.

REFERENCE BOOKS:-

Sl. No.	Author, Publisher & Address	Edition, Year of Publication	Title
1.	S.S. Sastry, Prestice Hall of India, New Delhi	Ed. 1994	Engineering Mathematics Vol-I
2.	Thomas &Finnery, Narosa Publishing Co. New Delhi	Ed. 1999	Calculus and Analytical Geometry
4.	B.S. Grewal, Krishna Publishers, New Delhi	Ed. 1999	Higher Engineering Mathematics
5	Murray R. Spiegel and Seymour Lipschutz, Mcgraw Hill, (Schaum's Outlines Series)	2 nd edition 2009	Vector Analysis
6	BhuDev Sharma, KedarNath Ram Nath	Latest	Differential Equations
7	Dr. M. D. Raisinghania, S. Chand	19 th Edition	Ordinary and partial Differential Equations
8	Shepley L. Ross, Wiley	Third Edition (Wiley Student Edition)	Differential Equations

SEMESTER - I

Course Title: Engineering Drawing

Course code: DME101

Prerequisite: None

Aim of the subject : Engineering Drawing is the subject which is the base of all the engineering branches and one of the mode of communications. The aim of the subject is to let the students know about the basics of the engineering drawing , need of the drawing in their respective branches for future applications. After studying the subject the students will be able to know the use and applications of different instruments in drawing, how these instruments are used in right from simple lettering to orthographic projection then to isometric projection.

CO---- Course Objective (Outcomebased)

After studying the subject the students will be able to

1. Know the use the drawinginstruments
2. Draw the simple geometrical drawings with the help of drawinginstruments
3. Appreciate the lettering graphicalprocess
4. Construct reducing scale, diagonalscale
5. Draw the projection of apoint
6. Draw the projection of a straightline
7. Represent the orthographic projection (including side and sectionalviews)
8. Draw isometricprojection
9. Know the use of rivets andscrews

TOPIC WISE MarksDisribution

SL.No	Major Topics	Hours Allotted	Weightage of Marks	No of marks		
				Obj	Short	Long
1	Introduction Chapter	12	20	4	4	12
2	Geometrical Constructions	12	20	4	4	12
3	Lettering and Scales	9	14	2	2	10
4	Projection of points	6	12	2	1	9
5	Projection of lines	9	14	2	2	10

6	Orthographic projection	15	24	4	4	16
7	Rivets heads and joints	6	10	2	1	7
8	Isometric Projection	9	14	2	4	8
9	Thread Profiles	3	4	1	3	0
10	Screwed fastenings	6	8	2	0	6
Total Hours		90	140	25	25	90

Unit Topic/ Sub Topic

1. INTRODUCTION [Total Hours: 12 Hrs] **SHEETNO-1**
 - 1.1 Drawing as a medium of communication
 - 1.2 Use and care of Drawing Instruments Assignments:
Such as Drawing of Horizontal and Vertical Lines, Square, Rectangle, Mosaic Pattern, Angular Pattern, Stamping with circular pattern.
 - 1.3 Types of Lines and Dimensioning as per 15696/72
2. GEOMETRICAL CONSTRUCTIONS [TOTAL HRS = 12 HRS.] **SHEET NO-2 & 3**
 - 2.1 Freehand curves, free hand Drawing
 - 2.2 Construction of triangles, Perpendicular and angles of 30° , 45° , 60° , 90°
 - 2.3 Construction of Regular Polygons.
 - 2.4 Regular Polygons inscribed in circles.
 - 2.5 Regular figures by using T – square and Set – square.
3. LETTERING, SCALES [Total Hours = 9 Hrs.] **SHEET NO-4**
 - 3.1 Single Stroke Lettering Straight and Inclined by graph and Free hand Letters and digits as per 15696/72.
 - 3.2 Scale- Representative Fraction, Types or Scales.
 - 3.3 Simple problems on Plain and Diagonal Scale. Assignments.
4. PROJECTION OF POINTS [Total Hrs. = 6Hrs.] **SHEETNO-5**
 - 4.1 Position / location of Points, Horizontal plane, Vertical plane.
 - 4.2 Assignments of Simple problems on different quadrants and Find the distance between two points.
 - 4.3 Position/ Location of Points.

Assignments of Line inclined with one or both the reference plane.
5. PROJECTION OF LINES [Total Hrs. = 9Hrs.] **SHEETNO-6**
 - 5.1 Position / location of Points, Horizontal plane, Vertical plane.
 - 5.2 Assignments of Simple problems on different quadrants and Find the distance between two points.
 - 5.3 Position/ Location of Lines.

SEMESTER - I

Course Title: Basic Workshop Practice

Course code: DME171

Course Content

1. Carpentry shop (12hrs) (Theory and Practice)

- 1.1 Introduction with the shop
- 1.2 Various structure of wood and types of wood
- 1.3 Different types of tools, machine and accessories used in Carpentry shop
- 1.4 Safety Precautions in workshop

Details of Practical Contents (3+3 hrs)

Demo of different wood working tools and machines

Demo of different wood working processes

Simple joints like T joints etc.

One simple utility job.

2. Fitting Shop (12hrs) (Theory and Practice)

- 2.1 Introduction with the fitting shop
- 2.2 Various marking, measuring, cutting, holding and striking tools
- 2.3 Different Operations like chipping, filing, marking drilling etc.
- 2.4 Working principle of drilling machine, lapping dies etc.

Details of Practical Contents (3+3 hrs)

Demo of different fitting tools and machines and power tools

Demo of different processes in fitting shop

Squaring of a rectangular metal piece

One simple utility job.

3. Welding Shop (12hrs) (Theory and Practice)

- 3.1 Introduction
- 3.2 Types of Welding, Arc Welding, Gas Welding, Gas Cutting
- 3.3 Welding of dissimilar materials, selection of welding rod material, size of rod and work piece

3.4 Different types of flames

3.5 Elementary symbolic Representation

3.6 Safety and precautions

Details of Practical Contents (3+3 hrs)

Demo of different welding tools and machines

Demo of Arc Welding, Gas Welding, Gas Cutter and rebuilding of broken parts with welding

Any one Composite job involving lap joint welding process.

4. Machine Shop (12hrs) (Theory and Practice)

4.1 Introduction

4.2 Study of Different types of Lathe machine, shaping machine, Drilling machine

4.3 Study of Different types of hand tools and machine tools and parts

4.4 Safety & precautions

Details of Practical Contents (3+3 hrs)

Demo of different machines and their operations

Preferably prepare a simple job.

Suggested Text/Reference Books:

(i) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

(ii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.

(iii) Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008.

(iv) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

(v) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw Hill House, 2017.

Course Outcomes:

Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

SEMESTER - II

Course Title: ENGINEERING MECHANICS

Course code: DME201

Aim of the subject: The aim of the subject is to let the students know about the basics of Engineering Mechanics and its applications in the engineering field. It mainly deals with forces, its different types and applications; Friction and its effect on machine components, how work is being converted to machine through its elements, relation between work power and energy.

CO—Outcome based objective

After studying the subject the students will be able to

1. Calculate the resultant of coplanar concurrent forces using analytical and graphical methods
2. Calculate the moments of forces
3. Determine the Centre of Gravity & Moment of Inertia of a lamina or sections
4. Apply the principle of simple friction in solving problems
5. Apply the principle of linear and circular motion in solving basic problems
6. Explain the Law of Machine
7. Solve problems on lifting machine

TOPIC WISE Marks Distribution

SL.No	Major Topics	Hours Allotted	Weightage of Marks	No of marks		
				O	S	L
1	Objective of Engineering Mechanics	1	2	2	0	0
2	Coplanar Concurrent Forces	9	18	5	5	8
3	Moments	6	13	3	4	6
4	Coplanar Non-Concurrent Forces	3	6	1	2	3
5	Centre of Gravity	4	10	2	3	5
6	Moment of Inertia	4	10	2	2	6
7	Friction	5	11	2	2	7
8	Motion	5	10	2	2	6
9	Work , Power and Energy	3	7	2	2	3
10	Simple Lifting Machines	5	10	2	2	6
Total Hours		45	97	25	25	47

Note- O means Objective, S means Short and L means Long Type

Detail of syllabus:

1.0 Objective of Engineering Mechanics. 1 hr

2.0 **COPLANAR CONCURRENT FORCES**

9hrs

2.1 Force, Units, Types, Effect of a force on a body.
1 hr

2.2 Scalar and Vector Quantities, Representation of a force as a Vector addition and subtraction of Vectors

2 hrs

2.3 Coplanar, Concurrent and Non-concurrent forces , Composition and Resolution of forces. Problems

2 hrs

2.4 Resultant for system of forces. Triangle Laws of forces, parallelogram and Polygon Law of Forces. Condition of equilibrium of coplanar current forces Bow's Notation, Lami's theorem, Analytical and graphical methods of problem solution

4hrs

3.0 **MOMENTS**

6 hrs

3.1 Moments of forces, Units, Clockwise-Anticlockwise moments, Varignon's theorem. Problems

2

hrs

3.02 Couples: Its moments.
1 hr

3.03 Load support reactions of a simply supported beam and overhanging beam.
2 hrs

4.00 **COPLANAR NON-CONCURRENT FORCES:**

3hrs

4.01 Condition of equilibrium of non concurrent coplanar forces, Resultant of funicular or Link polygon. Problems

5.00 **CENTER OF GRAVITY:**

4hrs

5.01 Centre of gravity and control, Definition of C.G. of a Plain triangular, rectangular lamina and Sections, Problems.

2hrs

5.2 C.G. of Symmetrical and Asymmetrical figures.
2 hr.

6.00 **MOMENT OF INERTIA:**

4 hrs.

6.01 Moments of inertia, Definition, Mathematical forces Unit.
1hr.

6.02 M.I. of Plane figures like triangle, rectangles and circles problems.

3 hrs.

7.00 **FRICTION:**

5hrs

7.01 Friction, Definition, Useful and harmful effects of friction.

1 hr.

7.02 Co-efficient of friction, angles of frictions and repose.

1 hr.

7.03 Equilibrium of a body on a rough horizontal and inclined plane, simple problem.

2hrs.

7.04 Ladder friction, simple problems

1hr

8.0 **MOTION:**

(5 hrs)

8.1 Linear and circular motion, Linear and angular velocities and acceleration, Units relation in between centrifugal force, Its uses in Engineering problems.

2hrs

8.2 Angle of banking super elevation problems.

2 hrs.

8.3 Bodies moving on a level circular path, skidding, overturning.

1 hr.

9.0 **WORK, POWER AND ENERGY:**

(3hrs)

9.1 Work, power and Energy definition and application

1 hr.

9.2 Potential and kinetic energy-definition and Units and their Engineering problems.

2hr

10. **SIMPLE LIFTING MACHINES**

(5 hrs).

10.1 Definition and importance of Simple Machines.

1 hr.

10.2 Law of Machine, problems.

1 hr.

10.3 Simple lifting Machines –simple Wheel and axle, differential wheel and axle and screw jack(simple) problems. 2 hrs.

10.4 Definition M.A, V.R and efficiency and their relationship. Simple problems. 1 hr

11.0 Three class tests

SEMESTER:I

Course title: Applied Physics I (Theory)

Course code: DPH101

Category: Basic Science Course

1. UNITS & DIMENSION (2 L)

- 1.1. Need of measurement and Unit in Engineering and Science, definition of unit, fundamental and derived quantities and their units, different system of units (CGS and SI), Illustrations.
- 1.2 Explanation of dimensions of physical quantities, dimensional equations of physical quantities and their uses with examples.

2 BASIC MECHANICS (12 L)

- 2.1 Introduction to scalar and vector quantities, representation of vector, addition, subtraction and multiplication of vectors, parallelogram law of vector addition, resolution of vector, dot and scalar product of two vectors (details not required).
- 2.2 Newton's laws of motion: First law, explanation, definition of force, Concept of Inertia, types of inertia (inertia of rest and inertia of motion), Newton's second law, momentum, impulse, mass & weight, simple problems, Third law, explanation and its examples, Principle of conservation of linear momentum, statement and simple examples.(e.g. recoil of a gun), numerical problems.
- 2.3 Circular motion, time period and angular velocity, relation between angular velocity and linear velocity, centripetal and centrifugal force, bending of a cyclist on a curved path, banking of roads and railway track , numerical problems.
- 2.4 Work, power and energy, its concept, units and dimension, Potential and Kinetic energy, its mathematical relations, Principle of conservation of energy, its proof in case of a free falling body under gravity, numerical problems.
- 2.5 Simple Harmonic Motion, its geometrical representations and derivation of its equations, definition of amplitude, time period, frequency, phase etc., mathematical relations and units, simple pendulum & second's pendulum, numerical problems.

3. GRAVITY AND GRAVITATION (3 L)

- 3.1 Newton's law of gravitation, acceleration due to gravity, relation between 'G' and 'g', their units, variation of the value of g with altitude and depth, Centre of gravity and Centre of mass, Numerical problems

4 ELASTIC PROPERTIES OF SOLID (3 L)

- 4.1 Deforming force, restoring force, Elastic and plastic bodies , explanation of stress and strain with their types, Hook's law, elastic limit , Young's modulus, Bulk modulus, Rigidity modulus, Poisson's ratio, their units and numerical problems

5 HEAT & THERMODYNAMICS (10 L)

- 5.1 Concept of heat and temperature, thermometer, different scales of temperatures and their conversion formulae, numerical problems.
- 5.2 Thermal expansion: expansion of Solid, linear, superficial and cubical expansion of solid, their coefficients & their relations; Expansion of liquid: co-efficient of Real and Apparent expansion, their relation, variation of density with temperature, Anomalous expansion of water (experimental determination not necessary). Concept of Absolute scale of temperature.
- 5.3 Calorimetry: Unit of heat, Joule and calorie, Specific heat, thermal capacity and water equivalent.
- 5.4 Change of state of a body, melting and freezing point, effect of pressure on melting point, latent heat, Evaporation, difference between vaporisation and evaporation, factors on which rate of evaporation depends.
- 5.5 Transmission of heat, three modes of heat transfer, conduction, convection and Radiation, good and bad conductor of heat, coefficient of thermal conductivity, its S.I. unit and dimension.
- 5.6 1st law and 2nd law of thermodynamics, Joule's law and Mechanical equivalent of heat.

6 SOUND (6 L)

- 6.1 Wave Motion: amplitude, time period, frequency and wavelength, relation between velocity, frequency and wavelength. Transverse and longitudinal waves with examples.
- 6.2 Propagation of sound wave: Expression of velocity of sound in air, Newton's formula and Laplace's correction, Effect of temperature, and pressure on velocity of sound.
- 6.3 Audible range, ultrasonic and infrasonic sound, application of ultrasonic sound to calculate the depth of ocean.
- 6.4 Reflection of sound and its application, Echo and reverberation of sound, acoustic of building
- 6.5 Doppler's effect with Mathematical expression .

Suggested Reference books.

1. Modern Approach to Physics Part I & II, Dilip Sarma, N G Chakraborty, and K N Sharma, Kalyani Publisher, New Delhi.
2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta, S K Kataria & Sons- New Delhi.
3. Basic Applied Physics, R K Gaur, Dhanpat Rai Publication- New Delhi.

Course title: Applied Physics I (Practical)

Course code: DPH171

Category: Basic Science Course

1. Vernier Calipers: To determine the volume of a metallic/wooden cube.
2. Screw Gauge : to determine cross sectional area of a wire/ thickness of a glass piece.
3. Spherometer: To determine the radius of curvature of concave and convex mirrors.
4. To determine the value of acceleration due to gravity (g) of a place with simple pendulum.
5. To measure the velocity of sound in resonance tube.
6. To determine the frequency of a tuning fork using a Sonometer.
7. Measurement of Specific gravity of solid, liquid, using Nicolson hydrometer, Hare's apparatus and specific gravity bottles.
8. To determine the atmospheric pressure by using Boyle's law apparatus.
9. To determine water equivalent of a calorimeter by method of mixture.

SEMESTER : II

Course title: Applied Physics II (Theory)

Course code: DPH201

Category: Basic Science Course

1.0 LIGHT (5 L)

- 1.1 Reflection, Reflection on spherical mirror, idea of real and virtual image, mirror formula, sign conventions (mirror formula to be assumed), nature size and position of images of different positions of objects, numerical problems.
- 1.2 Refraction, refractive index, critical angle, total internal reflection, between critical angle and refractive index, Prism, refraction through prism, minimum deviation, numerical problems. Lens, refraction through lens (lens formula to be assumed of a lens), numerical problems.

2.0 ELECTROSTAICS (3 L)

- 2.1 Concept of Electric charge according to modern electron theory, unit of charge, Inverse square law, electric field, Electric line of force, electric intensity
- 2.2 Potential at a point due to a point charge, relation between intensity and potential with deduction of the formula
- 2.3 Capacity of a condenser, series and parallel combination, different type of condenser, numerical problems.

3.0 CURRENT ELECTRICITY (12 L)

- 3.1 potential difference and electric current with their units.
- 3.2 Difference between emf. and potential difference; internal resistance of cell. Voltaic cell; defects of cell: local action and polarization and their removal.
- 3.3 Difference between primary and secondary cells with examples, grouping of cells, series, parallel and mixed combinations of cells.
- 3.4 Basic D.C. Circuits: Ohm's Law and its verification, mathematical expression, Kirchoffs Law, numerical problems.
- 3.5 Definition of resistance, conductance, effects of temperature on resistance, Series and parallel combination of resistance, resistance per unit length, numerical problems.

- 3.6 Heating Effect of Current: Joule's law, electricity energy and power, numerical problems
- 3.7 Chemical effect of current: electrolysis, Faraday's laws of electrolysis.

4.0 MAGNETISM (5 L)

- 4.1 Nature and artificial magnets theories, different types of magnets, induced magnetism, nature of polarities.
- 4.2 Inverse square law, magnetic intensity at end – on and broad – side on position, uniform and non – uniform field, magnetic moment, couple on a magnet in a uniform field, Tangent law.

5.0 ELECTROMAGNETISM (4 L)

- 5.1 Magnetic effect of current, nature of magnetic field due to straight and circular conductor, due to solenoid, Fleming's left hand and right hand rules, effect of current flowing through two parallel conductors.
- 5.2 Electro Magnetic induction: e. m. f. induced in a coil due to magnet, Faraday's laws of electro – magnetic induction, Lenz Law, self and mutual induction.

6.0 MODERN PHYSICS (4 L)

- 6.1 Photo electric effect with its physical significance.
- 6.2 Nuclear Energy: Atomic mass unit, mass energy equivalence, mass defect
- 6.3 X- rays: Properties and its application in industry (Production apparatus not necessary)

7.0 ELECTRONICS DEVICES AND SEMICONDUCTOR PHYSICS (4L)

- 7.1 Thermionic emission: vacuum tube, diode and triode, their working principle, concept of rectifier and amplifier, use of diode as rectifier
- 7.2 Concept of semi conductors, properties and basic principle, intrinsic and extrinsic semi conductor, p-type and n-type semi conductor.

Suggested Reference books.

1. Modern Approach to Physics Part I & II, Dilip Sarma, N G Chakraborty, and K N Sharma, Kalyani Publisher, New Delhi.
2. Applied Physics Part I & II, Manpreet Singh, Dr. Major Singh, and Mrs. Hitashi Gupta, S K Kataria & Sons- New Delhi.
3. Basic Applied Physics, R K Gaur, Dhanpat Rai Publication- New Delhi

Course title: Applied Physics II (Practical)

Course code: DPH271

Category: Basic Science Course

1. To verify the laws of reflection using a plane mirror and to study the characteristics of image formed.
2. To determine the refractive index of the material of the glass slab by pin method.
3. To determine the focal length of a convex lens by U-V method.
4. To determine the focal length of a convex lens by plane mirror method.
5. To draw I-D curve and to determine the refractive index of the material of a prism.
6. To locate the poles of a bar magnet and to measure the magnetic length.
7. To plot magnetic lines of force of a bar magnet with north pole pointing north and to locate the neutral point/to plot magnetic lines of force of a bar magnet with south pole pointing north and to locate the neutral point.
8. To verify Ohm's law by Ammeter-voltmeter method.
9. To find equivalent resistance using voltmeter with I. Three resistances connected in series II. Three resistances connected in parallel.
10. To measure the unknown resistance of the material of a wire by meter bridge using Wheatstone bridge principle.