



# MOTHERHOOD UNIVERSITY

Roorkee-Dehradun Road, Village Karoundi Post Bhagwanpur, Tehsil-Roorkee, Uttarakhand, India

## DIPLOMA IN ENGINEERING

(All Branches)

**I Year/1<sup>ST</sup> SEMESTER**

[Academic Session 2022-2023 onwards]





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Sr. No	Subject Code	Subject Name	Effective Teaching			Credits	Evaluation Scheme		
			L	T	P		Internal Assessment	End Term	Total Marks
			Hours/week						
<b>THEORY</b>									
1	MDFET22-101T	Applied Mathematics-I	2	1	0	3	30	70	100
2	MDFET22-102T	Introduction to IT Systems	2	0	0	2	20	30	50
3	MDFET22-103T	Applied Physics-I	2	1	0	3	30	70	100
4	MDFET22-104T	Applied Chemistry-I	2	1	0	3	30	70	100
5	MDFET22-105T	Communication Skills in English	2	0	0	2	30	70	100
		<b>TOTAL</b>	<b>10</b>	<b>3</b>	<b>0</b>	<b>13</b>	<b>140</b>	<b>310</b>	<b>450</b>
<b>PRACTICAL/PROJECT</b>									
6	MDFET22-151P	Engineering Workshop Practice	0	0	4	2	40	60	100
7	MDFET22-152P	Applied Physics-I	0	0	2	1	20	30	50
8	MDFET22-153P	Introduction to IT Systems	0	0	4	2	20	30	50
9	MDFET22-154P	Applied Chemistry-I	0	0	2	1	20	30	50
10	MDFET22-155P	Communication Skills in English	0	0	2	1	20	30	50
		<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>14</b>	<b>7</b>	<b>120</b>	<b>180</b>	<b>300</b>



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MDFET22-101T	Applied Mathematics-I	(L:2,T:1,P:0)	Credits:3
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## Course Objectives: -

This course is designed to give a comprehensive coverage at an introductory level to the subject of Trigonometry, Differential Calculus and Basic elements of algebra.

## Course outcomes:

Serial No.	Course Outcome	Blooms Level
CO1	The students are expected to acquire necessary background in Trigonometry to appreciate the Importance of the geometric study as well as for the calculation and the mathematical analysis.	Comprehension
CO2	The ability to find the effects of changing conditions on a system.	Comprehension
CO3	Complex numbers enter into studies of physical phenomena in ways that most people cannot imagine.	Application
CO4	The partial fraction decomposition lies in the fact that it provides an algorithm for computing the anti-derivative of a rational function	Application

## Syllabus:

### UNIT-I: Trigonometry

Concept of angles, measurement of angles in degrees, grades and radians and their conversions, T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2). Graphs of sin x, cos x, tan x and example .

### UNIT-II:

#### Differential Calculus

Definition of function; Concept of limits. Four standard limits  $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$ ,  $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ ,

$$\lim_{x \rightarrow a} \left( \frac{a^x - 1}{x} \right) \text{ and } \lim_{x \rightarrow a} (1 + x)^{\frac{1}{x}}$$

Differentiation by definition of  $x^n$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $e^x$  and  $\log_a x$ . Differentiation of sum, product and quotient of functions. Differentiation of function of a function. Differentiation of trigonometric and inverse trigonometric functions, Logarithmic differentiation, Exponential functions.

### UNIT-III:Algebra

**ComplexNumbers:**Definition, real and imaginary parts of a Complex number, polar and Cartesian ,representation of a complex number and its conversion from one form to other, conjugate of a complex number, modulus and amplitude of a complex number



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Addition, Subtraction, Multiplication and Division of a complex number. De Moivre's theorem, its application.

## UNIT-IV Partial fractions:

Definition of polynomial fraction proper & improper fractions and definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, repeated linear factors and irreducible non-repeated quadratic factors. To resolve improper fraction into partial fraction.

**UNIT-V Permutations and Combinations:** Value of  $nPr$  and  $nCr$ .

**Binomial theorem:** Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems

## Suggested Readings:-

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
2. G. B. Thomas, R. L. Finney, Calculus and Analytic Geometry, Addison Wesley, 9th Edition, 1995.
3. Reena Garg, Engineering Mathematics, Khanna Publishing House, New Delhi (Revised Ed. 2018)
4. Sundaram, R. Balasubramanian, K.A. Lakshmi Narayanan, Engineering Mathematics, 6/e., Vikas Publishing House
5. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi



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MDFET22-102T	Introduction to IT Systems	2(L:2,T:0, P:)	Credits:2
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## Course Objectives:

This course is intended to make new students comfortable with computing environment –Learning basic computer skills, learning basic applications of software tools, Understanding Computer Hardware, Cyber security awareness

## Course outcomes:

Serial No.	Course Outcome	Blooms Level
CO1	The student will be able to comfortably work on computer	Comprehension
CO2	To assemble a PC and connect it to external devices,	Comprehension
CO3	To write documents, create worksheets, prepare presentations,	Application
CO4	To protect information and computers from basic abuses/attacks.	Application

## Course Content:

**UNIT I:** Basic Internet skills: Understanding browser, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. General understanding of various computer hardware components–CPU, Memory, Display, Key-board, Mouse, HDD and other Peripheral Devices

**UNIT II:** OS Installation (Linux and M S Windows), Unix Shell and Commands, vi editor.

**UNIT III:** HTML4, CSS, making basic personal webpage

**UNIT IV:** Office Tools: Open Office Writer, Open Office Spreadsheet (Calc), Open Office Impress.

**UNIT V:** Information security best practices.

Class lectures will only introduce the topic order demonstrate the tool, actual learning Will take place in the Lab by practice regularly.

## Suggested Readings:-

- R.S.Salaria, Computer Fundamentals, Khanna Publishing House
- Ramesh Bangia, P C Software Made Easy–The P C Course Kit ,Khanna Publishing House
- Online Resources, Linuxman pages, Wikipedia
- MasteringLinuxShellScripting: A practical guide to Linux command-line, Bash scripting, and Shell programming ,by Mokhtar Ebrahim, Andrew Mallett



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MDFET22-103T	Applied Physics-I	(L: 2,T:1, P:0)	Credits:3	
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**Course Outcomes: At the end of the course the students will be able to**

Serial No.	Course Outcome	Blooms Level
CO1	Identify physical quantities; select their units for use in engineering solutions, and make measurements with accuracy by minimizing different types of errors.	Comprehension
CO2	Represent physical quantity scalar and vectors and solve real life relevant problems.	Comprehension
CO3	Analyse type of motions and apply the formulation to understand banking of roads/railwaytracks and conservation of momentum principle to describe	Application
CO4	State specific heats and measure the specific heat capacity of solids and liquids.	Application

## Course Objectives:

Applied Physics includes the study of a large number of diverse topics all related to materials/things that existing the world around us. It aims to give an understanding of this world both by observation and by prediction of the way in which such objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content. The course will help the diploma engineers to apply the basic concepts and principle to solve broad based engineering problems and to understand different technology based applications.

## Course Content:

### Unit I: Physical world, Units and Measurements

Physical quantities; fundamental and derived, Units and systems of units (FPS, CGS and SI units), Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Dimensional equations and their applications (conversion from one system of units to other, checking of dimensional equations and derivation of simple equations), Limitations of dimensional analysis.

Measurements: Need, measuring instruments, least count, types of measurement (direct, indirect), Errors in measurements (systematic and random), absolute error, relative error, error propagation, error estimation and significant figures

### Unit II: Force and Motion

Scalar and Vector quantities – examples, representation of vector, types of



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vectors. Addition and Subtraction of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product, Resolution of a Vector and its application in inclined plane and lawn roller.

Force, Momentum, Statement and derivation of conservation of linear momentum, its Applications such as recoil of gun rockets, Impulse and its applications.

Circular motion, definition of angular displacement, angular velocity, angular acceleration frequency, time period, Relation between linear and angular velocity, linear acceleration and angular acceleration (related numerical), Centripetal and Centrifugal forces with live examples, Expression and applications such as bending of roads and bending of cyclist.

## Unit III: Work, Power and Energy

Work: Concept and units, example soft zero work, positive work and negative work  
Friction: concept, types laws of limiting friction, coefficient of friction, reducing friction and its engineering applications, Work done in moving an object on horizontal and inclined plane for rough and plane surfaces and related applications.

Energy and its units, kinetic energy, gravitational potential energy with examples and derivations, mechanical energy, conservation of mechanical energy for freely falling bodies, trans-formation of energy (examples). Power and its units, power and work relationship, calculation of power (numerical problems).

## Unit IV: Properties of Matter

Elasticity: definition of stress and strain, moduli of elasticity, Hooke's law, significance of stress strain curve. Pressure definition Units Atmospheric Pressure Gauge pressure, absolute pressure, Fortin's Barometer and its applications. Surface tension: concept, units, cohesive and adhesive forces, angle of contact, Ascent Formula (No derivation), applications of surface tension, effect of temperature and impurity on surface tension. Viscosity and coefficient of viscosity: Terminal velocity, Stoke's law and effect of temperature on viscosity, application in hydraulic systems. Hydrodynamics Fluid motion, stream line and turbulent flow, Reynolds's number Equation of continuity, Bernoulli's Theorem (only formula and numerical) and its applications.

## Unit V: Heat and Thermometry

Concept of heat and temperature, modes of heat transfer (conduction, convection and radiation with examples), specific heats, scales of temperature and their relationship, Types of Thermometer (Mercury thermometer, bimetallic thermometer, Platinum resistance thermometer, Pyrometer) and their uses. Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them, Co-efficient of thermal conductivity, engineering applications.

## Suggested Readings:

1. Text Book of Physics for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
3. Engineering Physics by D K Bhattacharya & Poonam Tandan; Oxford University Press, New Delhi.
4. Comprehensive Practical Physics, Vol I & II, J N Jaiswal Laxmi Publications (P) Ltd., New Delhi
5. e-books/e-tools/learning physics software/websites etc.



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MDFET22-104T	Applied Chemistry-I	(L: 2, T: 1, P:0)	Credits:3	
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**Course Outcomes: At the end of the course the students will be able to**

Serial No.	Course Outcome	Blooms Level
CO1	Understand the classification and general properties of engineering materials such as metal, alloys, glasses, cement, refractory and composite materials using knowledge of chemical bonding.	Comprehension
CO2	Understand and assess the suitability of water source for domestic and industrial application, effluents and minimize water pollution.	Comprehension
CO3	Qualitatively analyze the engineering materials and understand their properties and applications.	Application
CO4	To understand about different types of fuel and lubricant and their applications in daily life	Application
CO5	Know about the concept of oxidation, reduction & different types of redox reactions involved in electrochemistry and different types of metallic corrosion and their preventive measures.	Comprehension

## Course Objectives:

There are numerous number materials are used in fabricating and manufacturing devices for the comfort to life. The selection, characterization and suitability assessment of natural raw materials essentially requires principles and concepts of Applied Chemistry for technicians. On successful completion of this course content will enable technicians to understand, ascertain and analyses and properties natural raw materials require for producing economical and eco-friendly finished products.

- Solve various engineering problems applying the basic knowledge of atomic structure and chemical bonding.
- Use relevant water treatment method to solve domestic and industrial problems.
- Solve the engineering problems using knowledge of engineering materials and properties.
- Use relevant fuel and lubricants for domestic and industrial applications
- Solve the engineering problems using concept of Electrochemistry and corrosion.
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## Course Content:

### Unit I: Atomic Structure, Chemical Bonding and Solutions

Rutherford model of atom, Bohr's theory (expression of energy and radius to be omitted), and hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertainty principle, Quantum numbers–orbital concept. Shapes of s ,p and d orbital's ,Pauli' s exclusion principle, Hund's rule of maximum multiplicity Aufbau rule, electronic configuration.

Concept of chemical bonding – cause of chemical bonding, types of bonds: ionic bonding





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(NaCl example), covalent bond ( $H_2$ ,  $F_2$ , HF hybridization in  $BeCl_2$ ,  $BF_3$ ,  $CH_4$ ,  $NH_3$ ,  $H_2O$ ), coordination bond in  $NH_4^+$ , and anomalous properties of  $NH_3$ ,  $H_2O$  due to hydrogen bonding, and metallic bonding.

Solution–idea of solute, solvent and solution, methods to express the concentration of solution-molarity ( $M$ =mole per liter), ppm, mass percentage, volume percentage and mole fraction.

## Unit II: Water

Graphical presentation of water distribution on Earth (pie or bar diagram). Classification of soft and hard water based on soap test, salts causing water hardness, unit of hardness and simple numerical on water hardness. Cause of poor lathering of soap in hard water, problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc), and quantitative measurement of water hardness by ETD A method, total dissolved solids (TDS) alkalinity estimation. Water softening techniques – soda lime process, zeolite process and ion exchange process. Municipal water treatment (in brief only) – sedimentation, coagulation, filtration, sterilization. Water for human consumption for drinking and cooking purposes from any water sources and enlist Indian standard specification of drinking water (collect data and understand standards).

## Unit III: Engineering Materials

Natural occurrence of metals minerals, ores of iron, aluminum and copper, gangue (matrix), flux, slag, metallurgy –brief account of general principles of metallurgy. Extraction of iron from hematite ore using blast furnace, aluminum from bauxite alongwith reactions. Alloys – definition, purposes of alloying, ferrous alloys and non-ferrous with suitable examples, properties and applications. General chemical composition, composition based applications (elementary idea only details omitted): Portland cement and hardening, Glasses Refractory and Composite materials.

Polymers – monomer, homo and co polymers, degree of polymerization, simple reactions involved in preparation and their application of thermoplastics and thermosetting plastics (using PVC, PS, PTFE, nylon-6, nylon-6, 6 and Bakelite), rubber and vulcanization of rubber.

## Unit IV: Chemistry of Fuels and Lubricants

Definition of fuel and combustion of fuel, classification of fuels, calorific values (HCV and LCV), calculation of HCV and LCV using Dulong's formula. Proximate analysis of coal solid fuel petrol and diesel-fuel rating (octane and cetane numbers), Chemical composition, calorific values and applications of LPG, CNG, water gas, coal gas, producer gas and biogas.

Lubrication–function and characteristic properties of good lubricant, classification with examples, lubrication mechanism – hydrodynamic and boundary lubrication, physical properties (viscosity and viscosity index, oiliness, flash and fire point, cloud and pour point only) and chemical properties (coke number, total acid numbers, oxidation value) of lubricants.

## Unit V: Electro Chemistry

Electronic concept of oxidation, reduction and redox reactions. Definition of terms: electrolytes,



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non-electrolytes with suitable examples, Faradays laws of electrolysis and simple numerical problems. Industrial Application of Electrolysis–

- Electrometallurgy
- Electroplating
- Electrolytic refining.

Application of redox reactions in electro chemical cells–

- Primary cells–dry cell,

Secondary cell- commercially used lead storage battery, fuel and Solar

Introduction to Corrosion of metals–

- definition, types of corrosion (chemical and electrochemical),  $H_2$
- liberation and  $O_2$  absorption mechanism of electrochemical
- Corrosion, factors affecting rate of corrosion.

Internal corrosion preventive measures–

- Purification, alloying and heat treatment and

External corrosion preventive measures:

- a) Metal (anodic, cathodic) coatings,
- b) organic inhibitors.

## Suggested Readings:-

- 1) Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi, 2017-18.
- 2) Aggarwal, & Shikha, Engineering Chemistry, Cambridge University Press; New Delhi, 2015.
- 3) C.N.R.Rao, Understanding Chemistry, Universities Press (India) Pvt.Ltd. 2011.
- 4) Dara,S.S.&Dr.S.S.Umare,EngineeringChemistry,S.Chand.Publication,New Delhi, 2015.
- 5) Jain &Jain, Engineering Chemistry, Dhanpat Rai and Sons; NewDelhi, 2015.
- 6) Dr.Vairam,S.,Engineering Chemistry,Wiley India Pvt.Ltd.,New Delhi,2013.
- 7) Dr.G.H.Hugar & Prof A.N.Pathak, Applied Chemistry Laboratory Practices, Vol.I and Vol.II, NITTTR, Chandigarh, Publications, 2013-14.



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<b>MDFET22-105T</b>	<b>Communication Skills inEnglish</b>	<b>2(L: 2, T: 0, P: )</b>	<b>Credits:2</b>
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**Course Outcomes: At the end of the course the students will be able to**

Serial No.	Course Outcome	Blooms Level
CO1	Develop basic speaking and writing skills including proper usage of language and vocabulary so that they can become highly confident and skilled speakers and writers.	Comprehension
CO2	Be informed of the latest trends in basic verbal activities such as presentations, facing interviews and other forms of oral communication.	Comprehension
CO3	Also develop skills of group presentation and communication in team.	Application
CO4	Develop non-verbal communication such as proper use of body language and gestures	Application

## Course Objectives:

Communication skills play an important role in career development. This course aims at introducing basic concepts of communication skills with an emphasis on developing personality of the students. Thus, the main objectives of this course are:

- To develop confidence in speaking English with correct pronunciation.
- To develop communication skills of the students i.e. listening, speaking, reading and writing skills.
- To introduce the need for personality development-Focus will be on developing certain qualities which will aid students in handling personal and career challenges, leadership skills etc.

## Course Content

### Unit-1 Communication: Theory and Practice

- Basics of communication: Introduction, meaning and definition, process of communication etc.
- Types of communication: formal and in formal, verbal non-verbal and written Barriers to effective communication.
- 7 Cs for effective communication (considerate, concrete, concise, clear, complete, correct, courteous).
- Art of Effective communication,
  - Choosing words, Voice, Modulation, Clarity, Time
  - Simplification of words, Technical Communication.

### Unit-II Soft Skills for Professional Excellence

- Introduction: Soft Skills and Hard Skills.
- Importance of soft skills.



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- Life skills: Self-awareness and Self-analysis, adaptability, resilience, emotional intelligence and empathy etc.
- Applying soft skills across cultures.
- Case Studies.

## Unit-III: Reading Comprehension

Comprehension, vocabulary enhancement and grammar exercises based on reading of the following texts:

### Section-1

*Malgudi Days*: R.K.Narayan

*The Room on Roof*: Ruskin Bond  
*“The Gift of the Magi”* by O. Henry  
*“Uncle Podger Hangs a Picture”* Jerome K. Jerome

### Section-2

*Night of the Scorpion* by Nissim Ezekiel, *Stopping by Woods on a Snowy Evening* by Robert Frost, *Where the Mind is Without Fear* by Rabindranath Tagore, *Ode to Tomatoes* by Pablo Neruda,

## Unit-IV: Professional Writing

The art of précis writing, Letters: business and personnel, Drafting e-mail, notices, minutes of a meeting etc. Filling-up different forms such as banks and on-line forms for placement etc.

## Unit-V: Vocabulary and Grammar

Vocabulary of commonly used words, Glossary of administrative terms (English and Hindi) One-word substitution, Idioms and Phrases etc. Parts of speech, active and passive voice, tenses etc., Punctuation

## Suggested Readings:

1. J.D.O'Connor. *Better English Pronunciation*. Cambridge: Cambridge University Press, 1980.
2. Lindley Murray. *An English Grammar: Comprehending Principles and Rules*. London: Wilson and Sons, 1908.
3. Kulbhushan Kumar, *Effective Communication Skills*, Khanna Publishing House, New Delhi (Revised Edition 2018)
4. Margaret M. Maison. *Examine your English*. Orient Longman: New Delhi, 1964.
5. M. Ashraf Rizvi. *Effective Technical Communication*. Mc-GrawHill: Delhi, 2002.
6. John Nielson. *Effective Communication Skills*. Xlibris, 2008.
7. Oxford Dictionary
8. Roget's *The Saurus of English Words and Phrases*
9. Collin's *English Dictionary*