DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
04	3	1	0	DE-101	APPLIED MATHEMATICS-I	BS

UNIT I

Algebra -I: Series: AP and GP; Sum, nth term, Mean, Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem, Determinants: Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Crammer's rule

UNIT II

Algebra- II: Vector algebra: Dot and Cross product, Scaler and vector triple product, Complex numbers, Representation, Modulus and amplitude Demoivre theorem, its application in solving algebraic equations, Mod. function and its properties.

UNIT III

Trigonometry: Relation between sides and angles of a triangle : Statement of various formulae showing relationship between sides and angle of a triangle, Inverse circular functions : Simple case only

UNIT IV

Differential Calculus – I: Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and differentiability, Methods of finding derivative, Trigonometric functions, exponential function, Function of a function, Logarithmic differentiation, Differentiation of Inverse trigonometric function, Differentiation of implicit functions.

UNIT V

Differential Calculus – II: Higher order derivatives, Leibnitz theorem (without proof). Simple applications, Application - Finding Tangents, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

RECOMMENDED BOOKS

1. R. D. Sharma, “Applied Mathematics – I & II for Diploma Courses”, Dhanpat Rai Publications.
2. “Mathematics for Class XI”, NCERT Publication, New Delhi.

3. “Mathematics for Class XII”, NCERT Publication, New Delhi.
4. H. K Dass, “Applied Mathematics for Polytechnics”, CBS Publishers & Distributers.
5. A Ganesh and G Balasubramanian, “Textbook of Engineering Mathematics – I”, CBS Publisher, New Delhi.
6. A Ganesh and G Balasubramanian, “Textbook of Engineering Mathematics –II”, CBS Publisher, New Delhi.
7. G. B. Thomas, R. L. Finney, “Calculus and Analytic Geometry”, Addison Wesley, Ninth Edition.
8. B S Grewal, “Elementary Engineering Mathematics”, Khanna Publishers, Delhi, Thirty fifth Edition.
9. R.K. Jain and S.R.K. Iyengar, “Advanced Engineering Mathematics”, Narosa Publishing House, New Delhi, Second Edition, 2003.
10. SS Sabharwal & Dr Sunita Jain, “Applied Mathematics Vol. I & II”, Eagle Parkashan, Jalandhar.
11. S Kohli, “Engineering Mathematics Vol. I & II”, IPH, Jalandhar.
12. Reena Garg & Chandrika Prasad, “Advanced Engineering Mathematics”, Khanna Publishing House, New Delhi
13. R. Pratap, “Getting Started with MATLAB 7”, Oxford University Press, Seventh Edition.

E-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
04	3	1	0	DE-102	APPLIED PHYSICS-I	BS

UNIT I

Unit and Dimensions: Definition of Physics, physical quantities- fundamental and derived, Units: fundamental and derived, System of units: CGS, FPS, MKS, SI; Dimension, dimensional formulae and SI units of physical quantities-distance, displacement, area, volume, density, velocity, acceleration, linear momentum, force, impulse, work, power, energy, pressure, surface tension, stress, strain), Dimensional equations, principle of homogeneity of dimensional equation, Application of dimensional analysis: checking the correctness of physical equation, conversion of system of unit (force, work, acceleration)

UNIT II

Force and Motion: Scalar and vector quantities– definition and examples, representation of vector, types of vector (unit vector, position vector, co-initial vector, collinear vector, co-planar vector), Vector algebra- addition of vectors, Triangle & Parallelogram law (statement and formula only), Scalar and vector product (statement and formula only), Force and its units, resolution of force (statement and formula only), Newton's laws of motion (statement and examples), Linear momentum, Law of conservation of linear momentum (statement and examples), Impulse, Circular motion: definition of angular displacement, angular velocity, angular acceleration, frequency, time period; Relation between linear and angular velocity, centripetal and centrifugal forces (definition and formula only), application of centripetal force in banking of road, Rotational motion: Definition of torque, angular momentum, moment of inertia and its physical significance

UNIT III

Work, Power and Energy, Work- definition, symbol, formula and SI unit, types of work (zero work, positive work and negative work) with example, Friction– definition and its simple daily life applications, Power- definition, formula and units, Energy- definition and its SI unit, examples of transformation of energy, Kinetic energy- definition, examples, formula and its derivation, Potential energy- definition, examples, formula and its derivation, Law of conservation of mechanical energy for freely falling bodies (with derivation), Simple numerical problems based on formula of Power and Energy

UNIT IV

Properties of Matter: Elasticity and plasticity- definition, deforming force, restoring force, example of elastic and plastic body, definition of stress and strain, Hooke's law, modulus of

elasticity, Pressure- definition, atmospheric pressure, gauge pressure, absolute pressure, Pascal's law, Surface tension- definition, SI unit, applications of surface tension, effect of temperature on surface tension, Viscosity: definition, unit, examples, effect of temperature on viscosity

UNIT V

Heat and Temperature: definition of heat and temperature (on the basis of kinetic theory), difference between heat and temperature, principle and working of mercury thermometer, modes of transfer of heat- conduction, convection and radiation with examples, properties of heat radiation, different scales of temperature and their relationship

RECOMMENDED BOOKS

1. "Text Book of Physics for Class XI (Part-I, Part-II)", N.C.E.R.T., Delhi.
2. Dr. HH Lal, "Applied Physics, Vol. I and Vol. II", TTTI Publications, Tata McGraw Hill, Delhi.
3. AS Vasudeva, "Applied Physics – I", Modern Publishers, Jalandhar.
4. R A Banwait, "Applied Physics – I", Eagle Prakashan, Jalandhar.
5. E-books/e-tools/relevant software to be used as recommended by AICTE/ HSBTE/ NITTTR. C. L. Arora, "Practical Physics", S Chand Publication.

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
03	3	0	0	DE-103	ENVIRONMENTAL SCIENCE & ENGINEERING	AU

UNIT I

Introduction: Basics of ecology, eco system- concept, and sustainable development, Sources, advantages, disadvantages of renewable and non-renewable energy, Rain water harvesting: Deforestation – its effects & control measures

UNIT II

Air and noise pollution: air pollution: source of air pollution. effect of air pollution on human health, economy, air pollution control methods, Noise Pollution: source of noise pollution, unit of noise, effect of noise pollution, acceptable noise level, different method of minimizing noise pollution

UNIT III

Water and Soil Pollution: Water Pollution-impurities in water, cause of water pollution, source of water pollution. effect of water pollution on human health, concept of do, bod, cod. prevention of water pollution- water treatment processes, sewage treatment, water quality standard: soil pollution: sources of soil pollution, effects and control of soil pollution, types of solid waste- house hold, industrial, agricultural, biomedical, disposal of solid waste, solid waste management e-waste, e – waste management

UNIT IV

Impact of Energy Usage on Environment Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings, Concept of Carbon Credit & Carbon footprint.

UNIT V

Disaster Management: Different types of disaster: natural disaster: such as flood, cyclone, earthquakes and landslides etc. man-made disaster: such as fire, industrial pollution, nuclear disaster, biological disasters, accidents (Air, Sea Rail & Road), structural failures (building and bridge), war & terrorism etc, Disaster preparedness: disaster preparedness plan prediction, early warnings and safety measures of disaster psychological response and management (Trauma, Stress, Rumour and Panic).

INSTRUCTIONAL STRATEGY

In addition to theoretical instructions, different activities pertaining to Environmental Studies and Disaster Management like expert lectures, seminars, visits etc. may also be organized This subject contains five units of equal weightage

RECOMMENDED BOOKS

1. S.C. Sharma & M.P. Poonia, “Environmental Studies”, Khanna Publishing House, New Delhi.
2. BR Sharma, “Environmental and Pollution Awareness”, Satya Prakashan, New Delhi.
3. Dr. RK Khitoliya, “Environmental Pollution”, S Chand Publishing, New Delhi.
4. Erach Bharucha, “Environmental Studies”, University Press (India) Private Ltd., Hyderabad. 5. Suresh K Dhamija, “Environmental Engineering and Management”, S K Kataria and Sons, New Delhi.
6. E-books/e-tools/relevant software to be used as recommended by AICTE/BTE/NITTTR, Chandigarh.
7. Dr. Mrinalini Pandey, “Disaster Management”, Wiley India Pvt. Ltd
8. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill Education (India) Pvt. Ltd.

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
03	3	0	0	DE-104	COMPUTER FUNDAMENTALS	ES

UNIT I

Definition of Computer, History of computer, Generations of Computer, Computer devices – Input devices, Output devices, Storage devices & Processing devices. Types of Computers – by purpose, by work & by size. Block Diagram/Components of computer – Input, Output, Memory unit, Control unit, ALU. Memory hierarchy, Types of computer memory – Primary memory & Secondary memory.

UNIT II

Number systems: Binary number system, Octal number system, Decimal number system, Hexadecimal number system. Number system conversion – Decimal number system to other base, other base to decimal number system, Other base to other base. Binary addition, subtraction, Multiplication, 1's complement, 2's complement.

UNIT III

Operating System, Software & Boolean Algebra, Introductions to operating system, Functions of operating system, Types of operating system, Computer Languages. Introduction to software, Types of software. Data processing cycle, Types of data processing cycle, Introductions to Boolean algebra, Logic gates – AND, OR, NOT, XOR, NAND, NOR & XNOR.

UNIT IV

Network & Security: Introduction to network & security, Types of networks – LAN, WAN, MAN, Topology, Transmission medium of signals, Transmission modes of communication, Virus & types of Viruses, Anti-virus.

Unit V

Internet & Web Browsing: Introduction to internet, Applications of internet, URL, Domain, Web Browser, Types of browsers – GUI & CLI browser, E-mail, Types of email account – email client & webmail, E- mail service providers, World Wide Web (www), Types of internet/network protocol.

RECOMMENDED BOOKS

1. V. Rajaraman and N. Adabala, Fundamentals of Computers, Prentice Hall of India Pvt. Ltd.

New Delhi, 6th Edition, 2015, 6th Edition, 2015, Prentice Hall of India.
2. R.K. Jain, IT Tools, Khanna Publishing House, First Edition, 1 January 2010
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2nd Edition, 1 January 2012
4. A. Goel, Computer Fundamentals, 2010, Pearson Education, 1st Edition, 13 April 2010
5. P. K. Sinha & P. Sinha, Fundamentals of Computers, 2007, BPB Publishers, 6th Edition, 2007

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
03	3	0	0	DE-105	FUNCTIONAL ENGLISH-1	HS

UNIT I

Introduction to grammar (what is grammar, its importance etc); different approaches to grammar: traditional, generative, transformative, and communicative.

UNIT II

Articles & determiners. Forms & functions of nouns, pronouns, and prepositions.

UNIT III

Verbs (transitive & intransitive, regular & irregular), tense & aspect, auxiliaries (primary &modal), negatives, questions, agreement & concord.

UNIT IV

Forms & functions of adjectives, adverbs, agreement & concord.

Reference books:

1. Leech, G. & J. Svartvik (2002) A Communicative Grammar of English. Pearson, India.
2. Pandey J. H. (2008) Complete Grammar, Shree Book Centre, Mumbai, India.
3. Murphy, R. (2009) Intermediate English Grammar. Cambridge Univ. Press, India.
4. Hewings, M. (2011) Advanced English Grammar. Cambridge Univ. Press, India.
5. Wren, P. C. & H. Martin (2000) High School English Grammar and Composition, S. Chand & Co, New

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
01	**0**	**0**	**2**	**DE-P-106**	**APPLIED PHYSICS-1 LAB**	**BS**

LIST OF EXPERIMENTS:

1. familiarization of measurement instruments and their parts (for example - vernier calliper, screw gauge, spherometer, travelling microscope etc.), and taking a reading. (compulsory to all students)

2. to find diameter of solid cylinder using a vernier calliper

3. to find internal diameter and depth of a beaker using a vernier calliper and hence find its volume.

4. to find the diameter of wire using screw gauge

5. to find thickness of paper using screw gauge.

6. to determine the thickness of glass strip using a spherometer

7. to determine radius of curvature of a given spherical surface by a spherometer.

8. to verify parallelogram law of force

9. to determine the atmospheric pressure at a place using Fortin’s barometer

10. to determine force constant of spring using Hooke’s law

11. measuring room temperature with the help of thermometer and its conversion in different scale.

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
01	0	0	2	DE-P-107	COMPUTER FUNDAMENTALS LAB	ES

PRACTICAL EXERCISES

1. Read Wikipedia pages on computer hardware components, look at those components in lab, identify them, recognize various ports/interfaces and related cables, etc.
2. Using Administrative Tools/Control Panel Settings of Operating Systems
3. Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
4. Explore features of Open Office tools and MS-Office, create documents, create presentation, create spread sheet, using these features, do it multiple times
5. Working with Conversion Software like pdf To Word, Word To PPT, etc.
6. Working with Mobile Applications – Searching for Authentic Mobile app, Installation and Settings, Govt. of India Mobile Applications
7. Creating email id, sending and receiving mails with attachments.
8. Using Google drive, Google calendar
9. Create Flow chart and Algorithm for the following
    a) Addition of n numbers and display result
    b) To convert temperature from Celsius to Fahrenheit
    c) To find Area and Perimeter of Square
    d) Swap Two Numbers
    e) find the smallest of two numbers
    f) Find whether given number is Even or Odd
    g) To print first n even Numbers
    h) find sum of series 1+2+3+…..+N
    i) print multiplication Table of a number
    j) generate first n Fibonacci terms 0,1,1,2,3,5…n (n>2)
    k) sum and average of given series of numbers
    l) Factorial of number n (n!=1x2x3x…n)
    m) Armstrong Number
    n) Find whether given number is Prime or not

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
02	0	0	3	DE-P-108	WORKSHOP PRACTICE LAB	ES

PRACTICAL EXERCISES

WELDING SHOP – I

1.1 Safety Precautions of concerned shop and use of personal protective equipment (PPE), demonstration of tools, equipment, sample jobs, Best practices in the concerned shop.

1.2 Introduction and importance of welding process as compared to other material joining processes. Specifications and type of ARC welding machines, parts identification, classification, selection and coding of electrodes, welding parameters, welding joints and welding positions. Common weldable materials, safety precautions in welding shop, use of Personal Protective Equipment, Use of welding screens, Hazards and remedies during welding, Elementary symbolic representations, demo of tools, equipment, sample jobs prepared, set up of Gas welding apparatus, and welding defects.

1.3 Jobs to be prepared

Job I Practice of striking arc and depositing uniform and straight beads onflat at different current levels. (Minimum 4 beads on M.S. flat at four setting of current level using shielded metal arc welding and differentiating their characteristics).

Job II Edge Preparation and welding lap joint using shielded metal arcwelding (SMAW) process.

Job III Edge Preparation and welding butt joint using shielded metal arcwelding process.

Job IV Edge Preparation and welding T Joint using shielded metal arcwelding (100mm x 6 mm M.S. Flat).

Job V To make a simple job using oxy acetylene gas welding.

FITTING AND PLUMBING SHOP – I

2.1 Safety Precautions of concerned shop and use of personal protective equipment (PPE), demonstration of tools, equipment, sample jobs, Best practices in the concerned shop.

2.2 Introduction and Function of holding/ clamping devices, hand tools and cutting tools,

2.3 Practical applications of fitting and plumbing

2.4 Introduction, function and types of marking and measuring tools and instruments (surface plate, try square, caliper, steel rule, scriber and Vernier caliper)

2.5 Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.) and identification of various steel sections (flat, angle, channel, bar etc.).

2.6 Introduction to various types of pipes (e.g water, steam, gas etc) and functions of various pipe fitting items (GI pipe fittings, CPVC pipe fittings), Methods of pipe joints

2.7 Introduction to various types of threads (internal and external)

2.8 Description and demonstration of various types of drills, taps and dies.

2.9 Jobs to be prepared:

Job I To fit hacksaw blade in its frame and perform hacksawing operation by using marking media and marking tool and straight sawing practice.

Job II To perform filing on MS workpiece (75 * 50 * 6 mm) for giving it a perfect rectangular shape and drilling, tapping operation.

Job III To perform step filing operation at right angle on MS workpiece.

Job IV Making external threads on a pipe by using die and to make a PVC/GI pipe connection using nipple and socket.

Job V Fitting of all components of wash basin and ball valve in a tank

MACHINE SHOP

3.1 Safety Precautions of concerned shop and use of personal protective equipment (PPE), demonstration of tools, equipment, sample jobs, best practices in the concerned shop.

3.2 Jobs to be Prepared

Job 1 Centering practice in 4 jaw chuck, setting of cutting tool point at appropriate height and perform facing and plain turning operations on MS rod.

Job II To sharpen various angles of turning tool.

Job III To perform step turning on MS rod.

Job IV To perform taper turning and under cutting operation.

Job V To perform step turning and knurling operation on MS rod.

CARPENTRY SHOP - I

4.1 Safety Precautions of concerned shop and use of personal protective equipment (PPE), demonstration of tools, equipment, sample jobs, Best practices in the concerned shop.

4.2 Introduction and industrial applications of carpentry jobs.

4.2.1 Name and use of raw materials used in carpentry shop : wood & alternative materials(board, plywood)

4.2.2 Introduction to wood, timber and their identification, shapes and specifications, their properties, applications & defects. Study of the joints in roofs, doors, windows and furniture, seasoning of wood

4.2.3 Names, uses, and types of hand tools such as Saws, C-Clamp, Chisels, Mallets, Carpenter's vices, Marking gauges, Try-squares, Rulers and other commonly used tools and materials used in carpentry shop by segregating as cutting tools, supporting tools, holding tools, measuring tools etc.

4.2.4 Specification of iron jack plane used in carpentry shop.

4.3 Practice

4.3.1 Practices for Basic Carpentry Work

4.3.2 Sawing practice using different types of saws

4.3.3 Assembling jack plane — planning practice including sharpening and blade adjustment of jack plane cutter

4.3.4 Chiselling practice using different types of chisels including sharpening of chisel

4.3.5 Making of different types of wooden pin and fixing methods. Marking measuring and inspection of jobs

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
01	0	0	2	DE-P-109	COMMUNICATION LAB	HS

1. Reading

Reading practice of lessons in the lab activity classes.

i. Comprehension exercises of unseen passages along with the lessons prescribed.
ii. ii. Vocabulary enrichment and grammar exercises based on the selected readings.
iii. iii. Reading aloud Newspaper headlines and important articles.

2. Fundamentals of Communication

i. Introducing oneself, others and leave- taking (talking about yourself)

ii. Just a minute (JAM) sessions: Speaking extempore for one minute on given topics

iii. Situational Conversation: Offering-Responding to offers; Congratulating; Apologizing and Forgiving; Complaining; Talking about likes and dislikes, Self-introduction Mock Interviews

3. Grammar and Usage

i. Written and Oral Drills will be undertaken in the class to facilitate holistic linguistic competency among learners.

ii. Exercises on the prescribed grammar topics.

Writing Skills

i. Students should be given Written Practice in groups so as to inculcate team-spirit and collaborative learning.
ii. ii. Group exercises on writing paragraphs on given topics.
iii. Opening an e-mail account, receiving and sending emails

DIPLOMA, I SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
01	0	0	2	DME-P-110	ANANDAM	VS

MODULE – 1

Individual Activities- Entry of one act of goodness by student in Daily diary/register (to be monitored by mentors)

MODULE – 2

Group Activity – Community service project (one project/semester) to be done by students outside university hours (Approved by Mentors in prescribed format)

MODULE – 3

30 minutes/day Anandam class in time table, in which Mentors will monitor the record of daily diary and presentations on group service projects.

MODULE – 4

Report of group projects approved by mentors to be submitted in prescribed formats.

MODULE – 5

Lectures, Webinars, Interactive sessions to be organized in department for students in monthly Anandam Day.

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
4	3	1	0	DE-201	APPLIED MATHEMATICS-II	BS

UNIT - I

Determinants and Matrices: Elementary properties of determinants up to 3rd order, consistency of equations, Crammer's rule, Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.

UNIT - II

Integral Calculus: Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only). Use of formulas, and for solving problems Where m and n are positive integers. Applications of integration for

i. Simple problem on evaluation of area bounded by a curve and axes.

ii. Calculation of Volume of a solid formed by revolution of an area about axes. (Simple problems).

UNIT - III

Co-Ordinate Geometry: Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.

General equation of a circle and its characteristics. To find the equation of a circle, given:
i. Centre and radius,
ii. Three points lying on it and
iii. Coordinates of end points of a diameter;
Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Problems on conics when their foci, directories or vertices are given.

UNIT - IV

Vector Algebra: Definition notation and rectangular resolution of a vector. Addition and subtraction of vectors. Scalar and vector products of 2 vectors. Simple problems related to work, moment and angular velocity.

UNIT-V

Differential Equations: Solution of first order and first-degree differential equation by variable separation method (simple problems). MATLAB – Simple Introduction.

References:

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. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.

4. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.

5. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
04	3	1	0	DE-202	APPLIED PHYSICS-II	BS

UNIT I

D.C. Circuits and A.C. Circuits: Resistivity, Effect of Temperature on Resistance, Ohm's Law, R8.4 Kirchoff's Law, Wheatstone Bridge, Meter Bridge, Principle of Potentiometer, Faraday's Laws of Electro Magnetic Induction, Lenz's Law, Self and Mutual Inductance, Alternating Current, Phase & Phase Difference, Instantaneous, Average and rms value of AC, Behaviour of Resistance, Capacitance and Inductance in an AC Circuit, AC Circuits Containing, R-L, R-C and LCR in Series, Power in AC Circuit and Power Factor, Choke Coil.

UNIT II

Semi Conductor Physics: Energy Bands in Conductor, Semi Conductor & Insulator, Chemical bonds in Semiconductor, Intrinsic and Extrinsic Semiconductors, PN-Junction Diode, Working, Biasing and Characteristics Curves, Zener Diode and Voltage Regulation using it, Half Wave & Full Wave Rectifiers (only working, no derivations), Junction Transistors, Working, Biasing and Characteristic Curves, Brief Idea of Using Transistors as an Amplifier (without mathematical analysis).

UNIT III

Sound Waves: Velocity of Sound Waves, Newton's Formula, Laplace Correction, Factors affecting Velocity of Sound Waves, Propagation of Progressive Wave, Displacement, Velocity and Acceleration of a particle during propagation of wave, Superposition of Waves, Stationary Waves (without mathematical analysis), Resonance tube.

UNIT IV

Gravitation & Satellites: Newton's law of Gravitation, Acceleration due to Gravity, Kepler's laws of Planetary Motion (statement only), Artificial Satellite (simple idea), Geo-Stationary Satellites, Escape Velocity, Velocity & Time Period of an Artificial Satellite.

UNIT V

Modern and Nuclear Physics: Photo Electric Effect, Einstein's Equation, Photo Cells, Lasers,

Stimulated Emission and Population Inversion, Types of Laser - Helium Neon and Ruby Laser, Application of Lasers (brief idea only), Material Processing, Lasers in Communication), Medical Applications. Nuclear Physics- Idea of Nuclear Force, Mass - Defect and Binding Energy, Nuclear Reactions, Natural and Artificial Radioactivity, Law of Radioactive Disintegration, Half Life & Mean Life.

References:

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. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi

4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi.

5. Modern approach to Applied Physics-I and II, AS Vasudeva, Modern Publishers.

6. A Textbook of Optics, N Subramanyam, Brij Lal, MN Avahanulu, S Chand and Company Ltd.

7. Introduction to Fiber Optics, Ajoy Ghatak and K Thyagarajan, Cambridge University Press India Pvt. Ltd, New Delhi.

8. Nanoscience and Nanotechnology, KK Choudhary, Narosa Publishing House, Pvt. Ltd. New Delhi.

9. Nanotechnology: Importance and Applications, M.H. Fulekar, IK International Publishing House Pvt. Ltd, New Delhi.

10. e-books/e-tools/ learning physics software/websites etc.

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
4	3	1	0	DE-203	APPLIED CHEMISTRY-II	BS

UNIT I

Atomic Structure, Periodic Table and Chemical Bonding.

Bohr's model of atom (qualitative treatment only), dual character of matter: derivation of de-Broglie's equation, Heisenberg's Principle of Uncertainty, modern concept of atomic structure: definition of orbitas, shapes of s, p and d-orbitals, quantum numbers and their significance. Electronic configuration: Aufbau and Pauli's exclusion principles and Hund's rule, electronic configuration of elements up to atomic number 30, Modern Periodic law and Periodic table, classification of elements into s, p, d and f-blocks, metals, non-metals and metalloids (periodicity in properties excluded), Chemical bonding: cause of bonding, ionic bond, covalent bond, and metallic bond (electron sea or gas model), Physical properties of ionic, covalent and metallic substances.

UNIT II

Metals and Alloys

Metals: mechanical properties of metals such as conductivity, elasticity, strength and stiffness, luster, hardness, toughness, ductility, malleability, brittleness, and impact resistance and their uses, Definition of a mineral, ore, gangue, flux and slag. Metallurgy of iron from haematite using a blast furnace. Commercial varieties of iron, Alloys: definition, necessity of making alloys, composition, properties and uses of duralumin and steel. Heat treatment of steel-normalizing, annealing, quenching, tempering.

UNIT III

Water, Solutions, Acids and Bases

Solutions: definition, expression of the concentration of a solution in percentage (w/w, w/v and v/v), normality, molarity and molality and ppm. Simple problems on solution preparation. Arrhenius concept of acids and bases, strong and weak acids and bases, pH value of a solution and its significance, pH scale. Simple numerical problems on pH of acids and bases. Hard and soft water, causes of hardness of water, types of hardness – temporary and permanent hardness, expression of hardness of water, ppm unit of hardness; disadvantages of hard water; removal of hardness: removal of temporary hardness by boiling and Clark's method; removal of permanent hardness of water by Ion-Exchange method; boiler problems caused by hard water: scale and sludge formation, priming and foaming, caustic embrittlement; water sterilization by chlorine, UV radiation and RO.

UNIT IV

Fuels and Lubricants

Fuels: definition and classification of higher and lower calorific values, units of calorific value, characteristics of an ideal fuel. Petroleum: composition and refining of petroleum; gaseous fuels: composition, properties and uses of CNG, PNG, LNG, LPG; relative advantages of liquid and gaseous fuels over solid fuels. Scope of hydrogen as future fuel.

Lubricants- Functions and qualities of a good lubricant, classification of lubricants with examples; lubrication mechanism (brief idea only); physical properties (brief idea only) of a lubricant: oiliness, viscosity, viscosity index, flash and fire point, ignition temperature, pour point.

UNIT V

Polymers and Electrochemistry

Polymers and Plastics: definition of polymer, classification, addition and condensation polymerization; preparation properties and uses of polythene, PVC, Nylon-66, Bakelite; definition of plastic, thermoplastics and thermosetting polymers; natural rubber and neoprene, other synthetic rubbers (names only).

Corrosion: definition, dry and wet corrosion, factors affecting rate of corrosion, methods of prevention of corrosion—hot dipping, metal cladding, cementation, quenching, cathodic protection methods, Introduction and application of nanotechnology: nano-materials and their classification, applications of nanotechnology in various engineering applications(brief).

RECOMMENDED BOOKS

1. “Textbook of Chemistry for class XI and XII (part I & II)”, NCERT, Delhi, 2017-18.
2. C.N. R. Rao, “Understanding Chemistry”, Universities Press (India) Pvt. Ltd, 2011.

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
4	3	1	0	DE-204	APPLIED MECHANICS-II	ES

UNIT – I

Basics of mechanics and force system

Significance and relevance of Mechanics, Applied mechanics, Statics, Dynamics. Space, time, mass, particle, flexible body and rigid body. Scalar and vector quantity, Units of measurement (SI units) - Fundamental units and derived units. Force – unit, representation as a vector and by Bow's notation, characteristics and effects of a force, Principle of transmissibility of force, Force system and its classification. Resolution of a force - Orthogonal components of a force, moment of a force, Varignon's Theorem. Composition of forces – Resultant, analytical method for determination of resultant for concurrent, non-concurrent and parallel co-planar force systems – Law of triangle, parallelogram and polygon of forces.

UNIT– II

Equilibrium

Equilibrium and Equilibrant, Free body and free body diagram, Analytical and graphical methods of analysing equilibrium Lami's Theorem – statement and explanation, Application for various engineering problems. Types of beam, supports (simple, hinged, roller and fixed) and loads acting on beam (vertical and inclined point load, uniformly distributed load, couple), Beam reaction for cantilever, simply supported beam with or without overhang – subjected to combination of Point load and uniformly distributed load. Beam reaction graphically for simply supported beam subjected to vertical point loads only.

UNIT– III

Friction

Friction and its relevance in engineering, types and laws of friction, limiting equilibrium, limiting friction, co-efficient of friction, angle of friction, angle of repose, relation between co-efficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to force parallel and inclined to plane. Equilibrium of bodies on inclined plane subjected to force parallel to the plane only.

UNIT– IV

Centroid and centre of gravity

Centroid of geometrical plane figures (square, rectangle, triangle, circle, semi-circle, quarter circle) Centroid of composite figures composed of not more than three geometrical figures Centre of Gravity of simple solids (Cube, cuboid, cone, cylinder, sphere, hemisphere) Centre of Gravity of composite solids composed of not more than two simple solids.

UNIT – V

Simple lifting machine

Simple lifting machine, load, effort, mechanical advantage, applications and advantages. Velocity ratio, efficiency of machines, law of machine. Ideal machine, friction in machine, maximum Mechanical advantage and efficiency, reversible and non-reversible machines, conditions for reversibility Velocity ratios of Simple axle and wheel, Differential axle and wheel, Worm and worm wheel, Single purchase and double purchase crab winch, Simple screw jack, Weston's differential pulley block, geared pulley block

References:

1. D.S. Bedi, Engineering Mechanics, Khanna Publications, New Delhi (2008)
2. Khurmi, R.S., Applied Mechanics, S. Chand & Co. New Delhi.
3. Bansal R K, A text book of Engineering Mechanics, Laxmi Publications.
4. Ramamrutham, Engineering Mechanics, S. Chand & Co. New Delhi.
5. Dhade, Jamadar & Walawelkar, Fundamental of Applied Mechanics, Pune VidhyarthibGruh.
6. Ram, H. D.; Chauhan, A. K., Foundations and Applications of Applied Mechanics, Cambridge
University Press.
7. Meriam, J. L.,

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
3	3	0	0	DE-205	FUNCTIONAL ENGLISH-II	HS

UNIT I: Communication

Meaning, Importance and Cycle of Communication, Media and Types of Communication, Formal and Informal Channels of Communication, Barriers to Communication, Division of Human Communication and Methods to Improve Interpersonal Communication, Qualities of Good Communication.

UNIT II: Reading Comprehension

Reading Comprehension, Vocabulary- Antonym, Synonyms, Homophones, Often confused words, Technical Terminologies

UNIT III: Functional Grammar:

Articles, Prepositions, Verb, Tense, Modal Verbs

UNIT IV: Composition:

Curriculum Vitae Writing, Business Letter Writing, Job Application Writing, Paragraph Writing, Precis Writing, Report Writing,

Suggested Readings:

1. Communication Skills, Pushplata & Sanjay Kumar, Oxford University Press, India.
2. The Written Word, Vandana Singh, Oxford University Press, India.
3. Current English Grammar and Usage with Composition, R. P. Sinha, Oxford University Press, India.
4. Rodriques M. V., 'Effective Business Communication', Concept Publishing Company, New Delhi, 1992 reprint (2000).
5. Bansal, R K and Harrison J B, 'Spoken English' Orient Longman, Hyderabad.
6. Binod Mishra & Sangeeta Sharma, 'Communication Skills for Engineers and Scientists, PHI Learning Private Ltd, New Delhi, 2011.
7. Gartside L. 'Modern Business Correspondence, Pitman Publishing, London.

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
3	0	0	3	DE-P-206	ENGINEERING DRAWING LAB	ES

UNIT I

1. Introduction to Engineering Drawing and Graphics

1.1 Introduction to use and care of drawing instruments, drawing materials, layout and sizes of drawing sheets and drawing boards.

1.2 Symbols and conventions

a) Conventions of Engineering Materials, Sectional Breaks and Conventional lines. .

1.3 Geometrical construction-geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagons, pentagons bisecting a line and arc, division of line and circle with the help of drawing instruments.

2. Technical Lettering of Alphabet and Numerals

Definition and classification of lettering, Free hand (of height of 5,8,12 mm) and instrumental lettering (of height 20 to 35 mm): upper case and lower case, single and double stroke, vertical and inclined (Gothic lettering) at 75 degree to horizontal and with suitable height to width ratio 7:4.

3. Dimensioning

3.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions).

3.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., countersunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches.

4. Scales

4.1 Scales –Needs and importance (theoretical instructions), Type of scales, Definition of Representative Fraction (R.F.) and Length of Scale.

4.2 To draw/construct plain and diagonal scales.

UNIT II

1. Orthographic Projections

1.1 Theory of orthographic projections (Elaborate theoretical instructions).

1.2 Three views of orthographic projections of different objects of given pictorial view of a block in 1st and 3rd angle.

1.3 Projection of Points in different quadrant

1.4 Projection of Straight Line (1st angle)

i. Line parallel to both the planes.

ii. Line perpendicular to any one of the reference plane and parallel to others

iii. Line inclined to any one of the references and parallel to another plane.

1.5 Projection of Plane – Different lamina like square rectangular, triangular, circle and Hexagonal

pentagon. Trace of planes (HT and VT).

1.6 Identification of surfaces.

2. Sectioning

2.1 Importance and salient features

2.2 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections (theoretical only).

2.3 Orthographic sectional views of different objects.

UNIT III

1. Introduction of projection of right solids such as prism & pyramid (square, Pentagon, Hexagonal) cube, cone & cylinder (Axes perpendicular to H.P and parallel to V.P.)
2. Introduction of sections of right solids - Section planes, Sections of Hexagonal prism, pentagon pyramid, cylinder and cone (Section plane parallel to anyone reference planes and perpendicular to V.P. and inclined to H.P.)

3. Development of Surfaces – Development of lateral surfaces of right solids like cone, cylinder, pentagonal prism, pyramid and hexagonal pyramid (Simple problems)

UNIT IV

Isometric Views

1. Fundamentals of isometric projections and isometric scale.

2. Isometric views of different laminas like circle, pentagon and hexagon.

3. Isometric views of different regular solids like cylinder, cone, cube, cuboid, pyramid and prism.

4. Isometric views from given different orthographic projections(front, side and top view)

UNIT V

Introduction to AutoCAD

Basic introduction and operational instructions of various commands in AutoCAD. At least two sheets of different objects on AutoCAD (given pictorial/isometric view of a block). AutoCAD skill of student is evaluated in internal assessment only not in external exam.

RECOMMENDED BOOKS

1. Surjit Singh, "A Text Book of Engineering Drawing", Dhanpat Rai & Co., Delhi.

2. PS Gill, "Engineering Drawing", SK Kataria & Sons, New Delhi.

3. ND Bhatt, "Elementary Engineering Drawing in First Angle Projection", Charotar Publishing House Pvt. Ltd., Anands.

4. T. Jeyapoovan, "Engineering Drawing and Graphics using AutoCAD", Vikas Publishing House Pvt, Ltd Noida.

5. S.R.Singhal and O.P.Saxena, "A Text Book of Engineering Drawing", Asian Publisher, Delhi.

6. RB Gupta, "Engineering Drawing", Satya Prakashan, New Delhi.

INSTRUCTIONAL STRATEGY

Teacher should show model of realia of the component/part whose drawing is to be made. Emphasis should be given on cleanliness, dimensioning and layout of sheet. Focus should be on proper selection of drawing instruments and their proper use. First angle projection is to be followed. Minimum of 20 sheets to be prepared and at least 2 sheets on AutoCAD. Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students. This subject contains five units of equal weight age.

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
1	0	0	2	DE-P-207	APPLIED PHYSICS LAB-II	BS

List of Practicals/Activities: (To perform minimum 12 Practicals)

1. To determine and verify the time period of a cantilever.
2. To determine velocity of ultrasonic in different liquids using ultrasonic interferometer.
3. To verify laws of reflection from a plane mirror/ interface.
4. To verify laws of refraction (Snell's law) using a glass slab.
5. To determine focal length and magnifying power of a convex lens.
6. To verify Ohm's law by plotting graph between current and potential difference.
7. To verify laws of resistances in series and parallel combination.
8. To find the frequency of AC main using electrical vibrator.
9. To verify Kirchhoff's law using electric circuits.
10. To study the dependence of capacitance of a parallel plate capacitor on various factors and determines permittivity of air at a place.
11. To find resistance of a galvanometer by half deflection method.
12. To convert a galvanometer into an ammeter.
13. To convert a galvanometer into a voltmeter.
14. To draw V-I characteristics of a semiconductor diode (Ge, Si) and determine its knee voltage.
15. To verify inverse square law of radiations using a photo-electric cell.
16. To measure wavelength of a He-Ne/diode laser using a diffraction grating.
17. To measure numerical aperture (NA) of an optical fiber.
18. Study of an optical projection system (OHP/LCD) - project report.

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
1	**0**	**0**	**2**	**DE-P-208**	**APPLIED CHEMISTRY LAB-II**	**BS**

List of Practical to be performed:

1. To prepare standard solution of oxalic acid.
2. To dilute the given KMnO4 solution.
3. To find out the strength in grams per litre of an unknown solution of sodium hydroxide using a standard (N/10) oxalic acid solution.
4. To find out the total alkalinity in parts per million (ppm) of a water sample with the help of a standard sulphuric acid solution.
5. To determine the total hardness of given water sample by EDTA method.
6. To determine the amount of total dissolved solids(TDS) in ppm in a given sample of water gravimetrically.
7. To determine the pH of different solutions using a digital pH meter.
8. To determine the calorific value of a solid/liquid fuel using a Bomb calorimeter.
9. To determine the viscosity of a lubricating oil using a Redwood viscometer.
10. To prepare a sample of Phenol-formaldehyde resin (Bakelite)/Nylon-66 in the lab.

DIPLOMA II SEMESTER

Credits	L	T	P	Course Code	Course Title	Category of Course
1	0	0	2	DE-P-209	APPLIED MECHANICS LAB-II	ES

List of Practical to be performed:

1. To study various equipments related to Engineering Mechanics.
2. To find the M.A., V.R., Efficiency and law of machine for Differential Axle and Wheel.
3. To find the M.A., V.R., Efficiency and law of machine for Simple Screw Jack.
4. Derive Law of machine using Worm and worm wheel.
5. Derive Law of machine using Single purchase crab.
6. Derive Law of machine using double purchase crab.
7. Derive Law of machine using Weston's differential or wormed geared pulley block.
8. Determine resultant of concurrent force system applying Law of Polygon of forces using force table.
9. Determine resultant of concurrent force system graphically.
10. Determine resultant of parallel force system graphically.
11. Verify Lami's theorem.
12. Study forces in various members of Jib crane.
13. Determine support reactions for simply supported beam.
14. Obtain support reactions of beam using graphical method.
15. Determine coefficient of friction for motion on horizontal and inclined plane.
16. Determine centroid of geometrical plane figures.